How can we solve water shortages in the World

～use seawater desalination system

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Abstract
This study explores how African countries can get safe water. I looked at global water problems, previous studies, and examples of seawater desalination. The results show that desalination can help reduce water shortages, but it cannot solve everything. More research is needed to find solutions that fit each country

1. Introduction (Background, Significance, and Purpose)

Today, 2.2 billion people do not have safely managed drinking water. Many people, especially women and girls, must walk long distances to get water. This causes loss of education and

work opportunities. Because of this situation, it is important to study better ways to supply safe water.

1-1. Social Context (Current Situation and Problems)

About 115 million people still use untreated water from lakes and rivers. Also, 1.8 billion people cannot get water inside their homes. In many families, women and girls collect water, which is dangerous and takes a lot of time.

More than 400 million people in sub-Saharan Africa rely on limited or unsafe water. Many rural areas face especially serious problems. These facts show that safe water access is a major global issue.

1-2. Previous Research

Previous studies say that Africa's water problems come from two main things: the lack of water resources and conflicts over limited water. Many researchers say local people need to manage water fairly and find sustainable ways to use it.

1-3. Research Question (RQ)

How can African countries be supplied with safe water?

1-4. Hypothesis

Seawater desalination may help solve water shortages. Some African countries have already started using it. The results differ by area, but desalination has real potential.

2. Research Method

I used Google Scholar to find academic articles and compared information from different studies.

3. Results and Discussion

3-1 Results

Recent droughts have increased the need for drinking and farming water. Morocco is building one of the largest desalination plants in Africa, which will support about 7.5 million people.

Israel already gets about 85% of its water from desalination and recycles 95% of wastewater. Other countries like Japan, the U.S., China, and France also have advanced water technologies.

3-2 Discussion

Working with countries that have strong water technologies could help Africa improve water access. Desalination is useful, but it should be combined with other methods. Different countries will need different solutions depending on their situation.

4. Conclusion and Future Prospects

Desalination can help African countries, but one solution cannot work for all nations. Future research should focus on plans that match each country's needs. It is also important to study economic support and how companies can join in a sustainable way.

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Voting Rights and Voter Turnout

Aiming to Resolve the Fundamental Issue

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Abstract

To address the necessity of suffrage and improve voter turnout in elections, I conducted research using online literature and proposed solutions.

1. Introduction (Background, Significance, and Purpose)

Last year, the goal was to increase voter turnout by providing entertainment to attract more visitors, aiming to boost turnout by capturing the audience's interest and curiosity. However, this approach lacked realism and did not address the root cause, so research proceeded with the goal of solving the fundamental problem.

1-1. Social Context (Current Situation and Problems)

In Japan today, declining voter turnout is cited as a major problem, with low levels of interest in and expectations for politics persisting. If this situation continues, it is possible that this right could disappear before we know it, making it necessary to find a solution. However, I also felt it was important to consider the possibility that the demand for elections has simply disappeared with the changing times. Therefore, I conducted research from two perspectives.

1-2. Previous Research

Regarding 投票環境と投票率, it was mentioned that the voting environment could significantly influence turnout rates. However, since the fundamental reasons for not voting were not addressed, I continued my research.

1-3. Research Question

Is the right to vote necessary in this era?

How can we increase voter turnout in elections?

1-4. Hypothesis

The necessity of suffrage is diminishing, which is why voter turnout is declining. Could it be that elections themselves are becoming unnecessary?

2. Research Method

Comparison with prior research available online

↓

Online opinions and interviews with actual eligible voters in the surrounding area

↓

Synthesizing these to reach a conclusion

3. Results and Discussion

3-1 Results

The significance of elections is explained in the Ministry of Internal Affairs and Communications' 総務省｜選挙の意義

While no country exists without elections, some have totalitarian or one-party dictatorships where free participation is not guaranteed, or nations where elections have become mere formalities.

The materials on 「参政権の保障をめぐる諸問題」に関する資料 organize the problems Japan currently faces regarding suffrage rights, including disparities in the value of votes, low voter turnout, and issues concerning eligibility for election and ageand the term of office and dissolution authority of Diet members during emergencies.

Research titled なぜ高齢世代の投票参加率は高いのか ―投票に行く理由の世代差から探る―concludes that the high voting rate among the elderly is not due to having more time or leisure, but rather because they strongly understand and have internalized the significance of the democratic system and universal suffrage. The low voting rate among the younger generation is considered to stem from a lack of understanding of democracy.

3-2 Discussion

Research findings indicate that debating whether suffrage is necessary or unnecessary is inherently difficult within the modern international community structured by democracy.

However, considering the numerous problems currently arising around suffrage, it is also clear that maintaining the status quo is not the best choice. Therefore, I believe preserving suffrage is an essential requirement. Furthermore, regarding the reasons for significant disparities in election turnout rates, it has been determined that differing levels of understanding about democracy are the cause. From conversations with people around me and opinions found online, it became clear that many voices point out the perceived low level of personal influence in elections. This led me to think that activities promoting the transparency of elections, along with visits by elected representatives to universities and high schools to explain their policies and future vision, are necessary.

4. Conclusion and Future Prospects

This research revealed that suffrage is an essential condition for standing in the international community during this era. Furthermore, to increase voter turnout, it is necessary for legislators to visit schools to explain policies, thereby enhancing transparency and deepening understanding of democracy. This will enable us to determine our own futures.

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「参政権の保障をめぐる諸問題」に関する資料

諸外国における世代別投票率

なぜ高齢世代の投票参加率は高いのか ―投票に行く理由の世代差から探る―

国政選挙での投票を義務化すべきか – 早稲田ウィークリー

投票環境と投票率

Toward Reducing Hunger in Africa

Through Agricultural Education

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Abstract
Hunger is a serious issue in Africa. This research investigates the causes of hunger and potential solutions through a literature review. The study reveals that low agricultural productivity due to manual labor and small-scale farming is a major cause. It concludes that introducing agricultural mechanization and education, supported by developed nations, is essential for sustainable food security.

1. Introduction (Background, Significance, and Purpose)
This section outlines the current state of hunger in Africa and the necessity of this research.

1-1. Social Context (Current Situation and Problems)
The hunger population in Africa is critically high compared to other regions. Hunger is defined as a state of continuous malnutrition due to food shortage. According to the WFP (2019), global hunger is estimated at 820 million people, with Africa having the highest prevalence. Major causes include economic disparities where grain is treated as a speculative investment, raising prices beyond the reach of the poor. Additionally, extreme weather damages crops, and conflicts force people to flee, leading to starvation

1-2. Research Question (RQ)
How can we reduce the hungry population in Africa?
1-3. Hypothesis
Hunger in Africa is caused by economic factors, conflicts, and climate change, and cannot be solved by food aid alone. To escape hunger, local food production is necessary. Therefore, I hypothesize that hunger can be solved if developed nations transfer agricultural technology to African countries.

2. Research Method
This study was conducted through a literature review and internet research. First, the current status and causes of hunger in Africa were investigated. Next, previous initiatives were analyzed. Based on this information, a hypothesis was formulated and verified by examining data on agricultural practices and productivity in Africa to draw a conclusion.

3. Results and Discussion

3-1 Results (結果)

Research shows that "low productivity" is a major agricultural issue in Africa. Most farms are small-scale; 72% of farms worldwide are under 1 hectare, and they are even smaller in developing countries. Mechanical equipment is scarce, and most work is manual. Reports

from Malawi indicate that many farmers lack the concept of raising seedlings in containers and instead sow seeds directly. A participant from Namibia noted that while some tools exist, they lack the performance of modern Japanese equipment.

3-2 Discussion (考察)

The reliance on manual labor in small farms leads to low productivity, low food self-sufficiency, and persistent poverty. Mechanization is crucial to break this cycle. However, mechanization requires significant capital for purchase and maintenance. Collective farming and shared use of machinery could reduce individual costs. Furthermore, food aid remains necessary during the transition period until mechanized agriculture becomes established. Innovations such as greenhouses can also help withstand extreme weather.

4. Conclusion and Future Prospects

To reduce hunger in Africa, increasing total food production through agricultural mechanization is essential. I propose that developed nations, such as Japan, dispatch personnel to assist African farmers in collectively purchasing and using agricultural machinery. Food aid should continue as a stopgap. This approach will enable long-term stable food production. Future research should address specific machinery types, crop selection, and conflict management.

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Reduce Waste with Reusable Tumblers

~Toward Reducing Plastic Consumption and Waste~

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Research Summary (Abstract)

Currently, plastic waste and the resulting environmental pollution are major issues. The use of plastic cups and PET bottles is particularly high. Simultaneously, in developing countries, the disposal of food waste is also a problem. An example is tumblers made from this waste. These are tumblers made from coffee grounds. Similarly, creating tumblers from coconut husks or corn can reduce plastic consumption and waste, while also enabling lower retail prices. Adding novelty and innovative sales approaches can further boost purchasing power. This research primarily aims to develop methods for creating these tumblers and propose appealing design concepts and strategies.

1. Introduction (Research Background, Significance, and Purpose)

1-1. Social Trends (Current Situation and Issues)

Trends constantly drive the world. In fact, trends can generate economic effects worth about one trillion yen. Global trends are expected to yield even greater economic impact. What is currently attracting attention? One example is the tumbler. Its popularity stems from its excellent functionality for carrying beverages, combined with its design appeal. On the other hand, they are considered difficult for long-term storage due to their low airtightness. However, vacuum-insulated tumblers have made it possible to maintain the temperature of beverages inside for extended periods. This research aims to use these tumblers to solve global problems.

Currently, the number of global problems is countless, and among them is the plastic problem. Specific examples include global warming, resource depletion, and marine pollution caused by the use of plastic bottles. The global volume of disposable plastic waste reached approximately 130 million tons in 2019. Furthermore, plastic incurs significant costs, including manufacturing expenses, disposal fees, and environmental remediation costs. Thus, plastic waste is one of the problems modern society must solve. While plastic cups and PET bottles are used and discarded in stores, and PET bottle recycling is increasing, recycling rates in regions like Europe outside Japan are only around 18% in some countries. While increasing recycling rates remains crucial, the high costs associated with both recycling and manufacturing itself make reducing consumption undeniably necessary.

However, to counter this, there is a broader effort to reduce plastic waste by using tumblers and reusable bottles. The goal is to decrease the use of plastic bottles through these alternatives.

In Japan, approximately 25 billion plastic bottles are consumed annually. This equates to about 500,000 tons of plastic waste per year. Suppose every person in Japan used a tumbler every other day. Since manufacturing plastic bottles requires large amounts of petroleum and chemical raw materials, cutting these costs—assuming a manufacturing cost of 100,000 yen per ton of plastic—would yield an estimated cost reduction of 25 billion yen for 250,000 tons. Furthermore, while disposal methods like recycling or landfill vary, assuming disposal costs ¥50,000 per ton, the 250,000 tons would save ¥12.5 billion. Combined with the manufacturing cost savings, this results

in an estimated total reduction of ¥37.5 billion, plus savings on environmental remediation costs. Tumblers often align with trends, making this initiative particularly promising.

The focus on tumblers extends beyond these savings. Tumblers enable the reuse of waste materials during their manufacturing process.

For example, tumblers made from coffee grounds currently exist. They are highly popular among some people due to their excellent aroma. What benefits would arise if tumblers were made using discarded parts of vegetables and fruits? If these vegetables are often produced in developing countries, it would benefit both nations. Indeed, developing countries face issues with waste generated from agricultural products like vegetables.Therefore, this research will proceed by addressing the challenge of determining which vegetable and fruit waste parts to use for making tumblers and devising strategies for their distribution.

1-2 Previous Research 1

There are actual examples of turning plant waste that would otherwise be discarded into various products. Coffee grounds have garnered significant attention from many companies in recent years and are now utilized in a wide variety of ways.

Aigoods Co., Ltd. is engaged in creating sustainable goods using coffee grounds that would otherwise be discarded. From their original eco-goods brand ‘SUS Brand’, born from food waste materials, they have launched ‘SUS coffee’—stylish cafe goods where every product reuses coffee grounds after extraction.

The first products released are the ‘SUS coffee tumbler’, easy to use indoors and outdoors, and the ‘SUS coffee notebook’, which carries a subtle coffee aroma. As shown on the left, their stylish design and pleasant scent have made them very popular.

https://prtimes.jp/main/html/rd/p/000000096.000032175.html

Additionally, the company behind the coffee-based goods focuses on practicality and features designed to encourage purchase. (Quote follows)

"For this development, we focused on achieving a distinctive texture derived from coffee grounds while maintaining a stylish design. If the texture isn't noticeable, people won't recognize it uses coffee grounds, and even if it's eco-friendly, it won't be used daily unless it's stylish. For the tumblers, we used color to create a stylish look. Brown offers a rich coffee feel for chic use, while

beige provides a soft atmosphere for casual use. Furthermore, since it isn't made from typical plastic materials, we particularly pursued durability and sustainability. After repeated discussions with the factory and numerous prototypes, we finally achieved the long-awaited productization."

Thus, products like tumblers require thoughtful design for practicality and popularity, making this aspect another objective of this research.

1-3 Research Questions

What fruits and vegetables should be selected to make tumblers from items destined for disposal in order to turn a profit? Is it even possible to make them in the first place? And what efforts are needed to boost the popularity of these tumblers?

1-4 Hypothesis

Currently, coconut waste disposal is a problem in India and other developing countries. If we could use this discarded coconut to make tumblers, wouldn't it benefit both the suppliers of the material and the manufacturers? This approach could reduce material costs while also improving environmental sustainability.

2. Research Methods

First, research how it is produced in existing companies, as well as whether other companies utilize coffee grounds or similar materials for production. (Since detailed production methods are rarely specified, primarily consider ingredients and other factors.) Next, investigate several plants and fruits with high waste volumes or disposal rates, selecting the most suitable option based on feasibility, efficiency, and popularity. Once the product concept is sufficiently defined, we will strengthen it by examining its connection to events where it can be purchased, its design, pricing, and initiatives, drawing from information and examples at various scales.

3. Research Findings and Discussion

The following four materials are initially considered as suitable candidates for tumbler production: coconut, mangosteen, pineapple, and corn. Suitability is first evaluated based on the following three criteria:

① High waste rate posing challenges, with a high proportion of producing countries being developing nations

② Whether processing technology exists to a degree that makes material conversion reasonably feasible

③ Whether utilization methods beyond fertilizer already exist and are widely adopted

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First, considering criterion ①: Waste rates are as follows:

Corn: Waste rate 50%

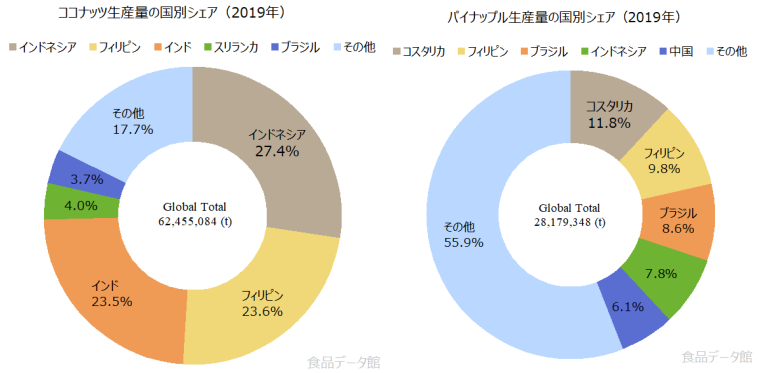
Pineapple: Waste rate 45% ← Produced in developing countries

Mangosteen: Waste rate 70%

Coconut: Outer husk 85% discarded ← Developed in developing countries

While pineapple has a disposal rate below 50%,

all four types exhibit high disposal rates. For pineapple and coconut,



as shown in the graph on the left, production is concentrated in developing countries like the Philippines, Costa Rica, and Indonesia. In coconut-producing nations such as Indonesia and the Philippines, significant waste is generated during coconut processing.

For example, extracting oil or milk from coconut fruit leaves behind shells and fibers. While this waste can be reused as fertilizer or fuel, inadequate processing can cause environmental problems, making this a pressing issue today.

Next, let's consider points ② and ③. Currently, technologies are expanding to utilize corn cobs and similar materials for various purposes, including fertilizer and charcoal. On the other hand, mangosteen receives less attention for reuse due to its lower profile, and related technologies are still developing. Pineapple cores are frequently reused in cooking, while leaves are already extensively repurposed into bags, clothing, straws, and other items, demonstrating strong awareness and practice of reuse. Coconuts utilize their shells; if only crushed shells are used, production could follow the same steps as coffee bean tumblers. However, since most coconut waste consists of fertilizer or fibrous material, its use in creating objects is not commonly seen.

Considering these three points, the materials are narrowed down to coconut, which is currently problematic, and corn, which has existing technology but is not widely used beyond fertilizer.

Technology exists to turn corn cobs into charcoal.

1. Dry boiled corn cobs and cut them into cubes.

2. Dry them in a well-ventilated, sunny area using a mesh basket.

3. Pack the prepared corn cobs into a short steel can.

4. Heat thoroughly using a generous amount of charcoal.

5. Remove from the stove and cool completely in a bucket of water. Once sufficiently cooled,

cut open the can and remove the contents.

After processing, it becomes charcoal like the one in the photo on the right. We consider using this charcoal to create charcoal tumblers.

Charcoal tumblers may be unfamiliar, but they are popular as celebratory gifts.

Coconuts are processed similarly to coffee bean tumblers: the shells are dried, crushed, and the resulting powder is used.

However, both types of tumblers face challenges.

The issue lies in the popularity and demand for either tumbler.

Since branded or popular shop tumblers exist, creativity is needed to encourage purchases.

According to ThinkDifferent, successful products share four characteristics:

・Clear before-and-after benefits for customers

・Credibility of the selling company or person

・Inclusion of novel elements

・Alignment with target customers' common sense

Regarding the first point—clear before-and-after benefits—presenting the advantages of using the tumbler is crucial. Specificity is also needed here. Simple, monetary benefits attract attention—use catchphrases like “Save ¥60,000 annually!” or “Reduce CO2 emissions after 15 uses!” However, since this applies to all reusable bottles, further differentiation is essential.

For the second point—trust in the seller—collaboration with well-known companies is crucial. Cafes, however, often lack the novelty factor (third point). Therefore, we propose collaborating with train stations. By managing sales at stations like JR, credibility can be established. Additionally, selling them alongside clothing made from pineapple waste at major apparel stores would spark interest among young people.

For the third point—novelty—the tumbler itself requires innovation. Thus, we propose region-specific original tumblers. However, this alone might still fall short on novelty. Therefore, to allow some visibility of the tumbler's contents, we will use color-changing materials on the regional logos and design sections that shift hues when water is poured over them, capturing interest. Alternatively, we could use thermochromic paint (Metamocolor) specifically on those areas. This approach will be implemented not just in Japan but in various locations. Being available for purchase inside stations increases the number of places where people can buy them. This also creates potential for collecting them. The fourth point, that it doesn't deviate from customer expectations, is not an issue. Its high usage frequency also makes it highly visible.

4. Conclusion and Future Prospects

Promoting tumblers made from discarded coconut parts and corn helps solve waste disposal issues in developing producer countries, reduces plastic use, and generates economic benefits. Additionally, incorporating logos or marks that evoke their respective locations, using materials that change color when filled with water like the example on the left, or employing temperature-sensitive paint that alters color, allows the contents of the tumbler to be somewhat discernible through the logo. Selling these at train stations and major clothing retailers builds trust and reassurance while making them highly visible. These innovations also offer novelty, necessitating strategies to further boost their popularity going forward.

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Rice Flour Production Using Imported Rice

～Feasibility and Challenges of Sustainable Production under Rice Shortages～

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Abstract

This study investigates the potential to expand rice flour production in Japan by utilizing imported rice varieties amid current domestic rice shortages and price increases. It evaluates the starch structures and functional properties of imported rice types, compares them with Japanese rice flour standards, and examines global research trends regarding rice flour suitability. The study also considers economic, agricultural, and food security implications, proposing a strategic framework in which imported rice supports immediate demand while long-term development focuses on establishing a sustainable Japanese rice–based rice flour industry.

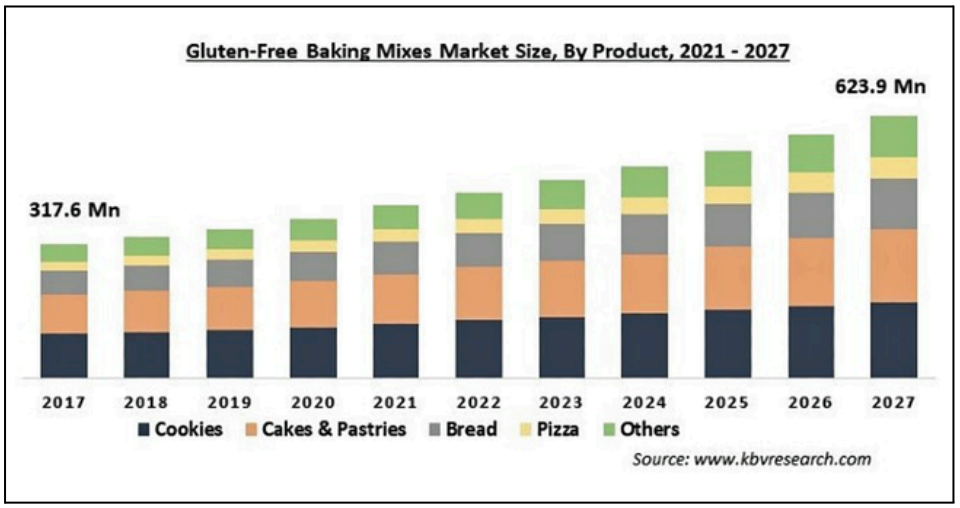

Table: Market size of gluten-free baking mixes

1. Introduction (Background, Significance, and Purpose)

When I was an elementary school student, I enjoyed eating rice flour bread served in school lunches. Even now, I would like to eat rice flour bread, but I have few opportunities to do so. I also realized that making rice flour bread at home is not as easy as making bread with wheat flour. While researching this topic, I learned about activities that promote the use of rice flour in Japan. However, I also found that there are still many challenges in using rice flour as a substitute for wheat flour, especially in terms of availability, cost, and ease of use. This made me wonder why rice flour has not become more common, even though it has many advantages.These experiences and questions motivated me to start this research. I wanted to explore ways to make rice flour more widely used and easier to access, especially by considering new approaches to rice flour production. The purpose of this study is to focus on the characteristics of rice varieties produced overseas and to examine whether they can be used as raw materials for rice flour in Japan. In particular, this study aims to compare the starch structure and processing properties of imported rice with those of Japanese rice used for rice flour, and to clarify their suitability for rice flour production.

The significance of this study lies in presenting a realistic solution for the stable supply of rice

flour by using imported rice in the short term. In the medium to long term, it provides basic knowledge for considering the development of a sustainable rice flour production system based mainly on Japanese rice. In addition, this study has social significance because it examines the possibility of improving Japan's food self-sufficiency rate and creating new opportunities in agriculture and the food industry through the wider use of rice flour.

1-1. Social Context (Current Situation and Problems)

Japan is currently experiencing rising rice prices and decreased domestic production due to changing consumption trends, climate impacts, and shifting agricultural demographics. As a result, imported rice has become more widely available. However, imported rice often differs from Japanese short-grain varieties in taste, texture, and starch composition, making it less suitable for traditional Japanese cuisine. Given the growing demand for rice flour as a gluten-free alternative and as an ingredient for processed foods, there is an urgent need to explore whether imported rice can serve as a reliable raw material for rice flour production.

1-2. Previous Research

Previous studies have examined the physicochemical properties of rice starches from various regions. Research from Thailand, Vietnam, the United States, and India has highlighted differences in amylose content, starch granule morphology, and gelatinization temperatures across cultivars such as *IR64*, *Koshihikari-derived lines grown abroad*, *Jasmine*, and *Basmati*. Studies have shown that high-amylose rice tends to produce rice flour suitable for crispy textures, while low-amylose varieties are better for soft, elastic applications. However, limited research has explored how these findings apply to Japanese rice flour standards or how imported rice might be systematically integrated into the Japanese rice flour market.

1-3. Research Question (RQ)

This study seeks to answer the following central question:

RQ: Can imported rice varieties be effectively used to produce rice flour comparable in functionality and quality to Japanese rice flour, and what implications does this have for Japan's food security and rice industry?

This question reflects concerns about the long-term sustainability of Japan's rice supply and the need to maintain product quality while addressing shortages.

1-4. Hypothesis

The hypothesis of this study is:

H1: Certain imported rice varieties possess starch structures and physicochemical properties that make them suitable for rice flour production meeting Japanese quality standards.

This hypothesis is supported by global research indicating that some long-grain and medium-grain rice varieties exhibit functional behaviors comparable to Japanese short-grain rice when milled into flour.

2. Research Method

This study uses a literature-based comparative approach. First, previous studies on rice starch composition, the balance between amylose and amylopectin, heating properties, and milling characteristics were reviewed. Next, major rice-producing countries that export rice to Japan, such as the United States, Vietnam, Thailand, and India, were examined to identify rice varieties commonly used for rice flour production overseas. These varieties were then compared with the characteristics of rice flour typically used in Japan. Finally, economic and agricultural data were reviewed to consider whether imported rice could realistically be used in Japan's rice flour market.

3. Results and Discussion

3-1 Results

In Japan, demand for rice flour products has been steadily increasing in recent years, partly due to the growing interest in gluten-free foods. However, despite this demand, the high cost of raw rice and the limited supply of suitable rice varieties remain significant barriers to the widespread adoption of rice flour. In particular, different applications of rice flour—such as bread, noodles, and confectionery—require specific functional properties, making it essential to ensure a stable supply of raw materials with consistent quality.

At the same time, Japan possesses advanced processing technologies and milling facilities, enabling the stable production of high-quality rice flour with fine particle size. Nevertheless, the cultivation area dedicated to rice varieties specifically developed for rice flour remains limited, and the supply of raw materials is insufficient to fully meet demand. This supply constraint may contribute to the relatively high price of rice flour products and hinder their broader diffusion in the market.

Given these challenges, it is reasonable to consider a new supply model in which raw material production and processing are geographically separated. Specifically, rice varieties suitable for rice flour production could be cultivated in overseas regions where rice can be produced in large quantities at relatively low cost. The harvested rice would then be imported into Japan and processed using the country's advanced milling technologies. For example, "Mizuhotikara," a rice variety developed for rice flour, is cultivated in warm and high-rainfall regions such as Kumamoto Prefecture. These environmental conditions are similar to those found in major rice-producing areas in southern Vietnam and central Thailand, suggesting the potential feasibility of cultivating similar varieties in these regions.

Variety	Production Region	Environmental Characteristics	Similar Regions	Reason for Similarity
Mizuhotikara	Kumamoto Prefecture, Kyushu Region	Warm and humid climate; high summer temperatures; abundant rainfall; suitable for paddy rice cultivation	Southern Vietnam, Central Thailand	High temperature and humidity; abundant water resources; suitable for paddy rice cultivation
Emiwata	Hokuriku Region, Southern Tohoku	Warm and humid; relatively warm summers; cold winters	Northeastern China, Central Korea	Similar climate conditions for paddy rice cultivation ranging from cool to warm

Figure: Overseas regions with environmental conditions similar to rice varieties suitable for rice flour (part of the study)

This study adopts a literature-based comparative approach to examine the feasibility of such a supply model from multiple perspectives. First, previous studies on rice starch composition—including the balance between amylose and amylopectin—as well as heating properties and milling characteristics were reviewed. Next, major rice-exporting countries to Japan, such as the United States, Vietnam, Thailand, and India, were analyzed to identify rice varieties commonly used for rice flour production overseas. These varieties were then compared with those typically used in Japan. Finally, economic and agricultural data were examined to assess whether the use of imported rice could serve as a realistic and sustainable option for Japan's rice flour market.

3-2 Discussion

These results suggest that imported rice varieties can reasonably substitute for Japanese rice in rice flour production under specific applications. This challenges the previous assumption that only Japanese rice is suitable for high-quality rice flour. Leveraging imported rice could help stabilize supply and reduce costs, encouraging broader adoption of rice flour in the food industry. However, reliance on imported rice risks creating long-term dependence and may hinder efforts to rebuild domestic rice self-sufficiency. A hybrid strategy—using imported rice for immediate demand while investing in rice strain development and domestic rice cultivation for future independence—appears most sustainable.

4. Conclusion and Future Prospects

This study concludes that imported rice varieties possess sufficient functional properties to serve as a viable raw material for rice flour production in Japan. While short-term expansion of rice flour production using imported rice is feasible and beneficial, long-term strategies must prioritize domestic rice revitalization. Future research should focus on breeding rice varieties optimized for rice flour, adapting Japanese rice strains for suitable climates abroad, and developing a dual-structure supply system that balances imported and domestically grown rice.

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Food waste at sporting events

～ For Improving the Image of Sports

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【Food waste at sporting events】

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Abstract

The world currently faces numerous problems. Among these, “food waste” stands out as a significant issue. Within this broader problem, various sub-issues exist, such as “food waste in households.” My research focuses specifically on “food waste at sporting events.” The goal of this study is to eliminate food waste at sporting events and foster a more positive image of sports. To achieve this, I propose two strategies: “implementing a reservation system at concession stands” and “introducing containers designed for easy takeout.” Implementing these measures is expected to yield positive effects in reducing unsold food waste and leftover consumption. However, a potential challenge with these policies is the possibility that customers may not support the reservation system. To overcome this, it is crucial to create incentives, such as distributing coupons to customers who utilize the reservation system and make purchases.

1. Introduction (Background, Significance, and Purpose)

I am interested in food loss. I think food loss is the most important problem, and we have to solve this problem. However it is difficult to solve all food loss. So I want to narrow down the location. I am interested in sports, too. So I want to solve food loss in sports.

1-1. Social Context (Current Situation and Problems)

Today, many problems are happening in the world.

One big problem is food loss. Food loss means throwing away food that could still be eaten.

For example, food left on a plate, food bought in large amounts on sale but not eaten, or vegetables that are peeled too much.

Because of food loss, water, farmland, and chemical fertilizers used to make food are wasted.Right now, food loss happens in many places, such as in homes and restaurants.

In fact, about 2.5 billion tons of food are lost every year in the world.There is also food loss at sports events. For example, food left unsold at food stands, or food that spectators do not finish eating. Reducing this food loss has become very important today.

1-2. Previous Research

The Consumer Affairs Agency tested ways to reduce food loss at large events with tens of thousands of people, thinking ahead to the Osaka and Shikoku Expo.

They carried out activities at a professional baseball game held at Rakuten Seimei Park Miyagi. These activities included teaching visitors about reducing food loss and holding a “food drive,” where unused food was given to food bank groups. They wanted to check how effective these actions were.As a result, people’s awareness of reducing food loss became stronger. Compared to before the activities, the number of people who said they wanted to try reducing food loss increased by 8 points.

Food loss itself also changed.During the period when these actions were taken, the average food loss per sales amount decreased by 11.3%. Food loss per number of visitors decreased by 17.9%, and food loss per number of food purchases decreased by about 11.9%.These results show that even simple actions like teaching people and holding a food drive can make a clear improvement.

1-3. Research Question (RQ)

The research question for this study is: "What are better incentives for restaurants under a reservation system, and what is the optimal policy for reducing food waste?" I decided to address this by dividing the approach into two areas: food loss measures for restaurants at sporting events and food loss measures for spectators. First, regarding measures for restaurants, I considered that adopting a reservation system could lead to a reduction in food loss by providing a certain degree of clarity on the number of attendees. However, agreement from the restaurant side is essential for this, and the initial focus of this study is to consider the incentives required to gain their consent. Secondly, I feel that the most crucial aspect of measures targeting spectators is the reduction of plate waste (leftovers). While it is challenging to devise policies that influence individual choices in this regard, even a small reduction is vital, which is why this became the focus of the latter half of the study.

1-4. Hypothesis

The hypothesis for the first part is that a potential incentive for restaurants to adopt a reservation system could be the strengthening of advertising and promotion. Since restaurants might be wary of a drop in customer numbers due to introducing a reservation system, strengthening promotional power through advertising could mitigate any potential decline in sales. We believe this strategy would encourage more organizations to adopt the reservation system. For the second part, a conceivable measure is the provision of food in easily portable containers. As spectators are expected to arrive from various locations to the event venue, the ease of taking food home becomes an important factor. Therefore, by offering food in containers that are easily portable—such as those that can be securely sealed and won't open with minor impact—people who travel from afar can safely take their leftovers home, which should contribute to the reduction of food waste (leftovers) at the event venue. However, due to potential cost issues, low-cost implementation is essential.

2. Research Method

The research methodology should focus on gathering opinions regarding the hypotheses we have just established. By having these hypotheses considered from an objective viewpoint, we can receive feedback and perspectives that we might not be aware of ourselves. It will be crucial to consider how these opinions can be used to improve our hypotheses and ultimately

find effective solutions.

3. Results and Discussion

3-1 Results（結果）

I received feedback regarding the policies I proposed. A particularly critical point raised was the concern that "making restaurants reservation-only might diminish the unique enjoyment and atmosphere characteristic of sports spectating." This feedback highlights a crucial issue for gaining customer acceptance of the reservation system and requires immediate improvement.

3-2 Discussion（考察）

To address this challenge, one possible solution is to allow for not only reservations but also on-the-spot purchases on the day of the event. If we implement a completely reservation-only system, there is a risk of not gaining customer acceptance from the perspective of the enjoyment and atmosphere of sports spectating. However, by permitting same-day purchases, we believe we can gain approval from the perspective of maintaining the unique experience. The most critical goal in implementing this policy is to primarily track the number of purchasers. Therefore, the effectiveness of this policy will be weakened if we do not increase the number of customers using the reservation system. To achieve this, we need to create benefits for customers who use the reservation system, encouraging more people to purchase through it. The most effective benefit is considered to be the distribution of coupons at the time of reservation. This creates an advantage to reserving, which allows us to keep same-day purchases to a minimum. This measure is expected to contribute significantly to reducing unsold food waste. In overseas research papers, it is said that sales of products without packaging or with limited packaging, and sales using eco-friendly cups are very effective.It is important to make good containers to reduce leftover food.But it is also important to consider the environment by producing these containers.

4. Conclusion and Future Prospects

The current answer to the research question is as follows: Firstly, the optimal incentive for restaurants is considered to be promotion through advertising, which can mitigate the potential decrease in customers resulting from the introduction of a reservation system. Secondly, the best measure for reducing plate waste is the provision of food in easily portable containers. However, due to potential cost issues associated with changing containers, low-cost implementation is vital. Furthermore, the material of the containers must also be environmentally friendly. By implementing food loss reduction measures on both the restaurant and spectator sides, we believe that we can contribute to the global food loss problem in the context of sports spectating. This will also help foster a better global image for

sports events. The next steps I should take are to refine the proposed solutions into more specific and concrete plans. It is highly likely that new problems will emerge during this refinement process. It will be crucial to solve these problems one by one to eventually develop a final proposal that is more realistic and easily understandable.

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Food waste at major sporting events:an olympic-sized problem 2024/8/7/commercial

Connections Made Through Music

Reducing Mental Illness Through Music Therapy

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Abstract （研究の概要）

Now, an estimated 792 million (WHO, 2020) people worldwide—one in ten—live with mental illness. In regions like Asia and Africa, people with mental illness often face unjust violence or are forced to live in unsanitary conditions simply because of their condition. Moreover, the number of people with mental illness is increasing worldwide. Therefore, this study examines methods to reduce mental illness through music therapy by referring to examples from the United States and Germany, where music therapy is widely practiced. The aim is to identify approaches that can be easily implemented in various regions. This study aims to clarify how music therapy can be more widely implemented in healthcare systems.

1. Introduction (Background, Significance, and Purpose)

In recent years, I have focused my research on music therapy and its impact on people's lives. Recently, I have personally observed that many people experience high levels of stress, which often leads to a decline in their quality of life. This research began with the question of whether there are accessible ways to address this issue. This topic was chosen based on my personal interest in music and my belief in its potential to positively influence people's lives.

1-1. Social Context (Current Situation and Problems)

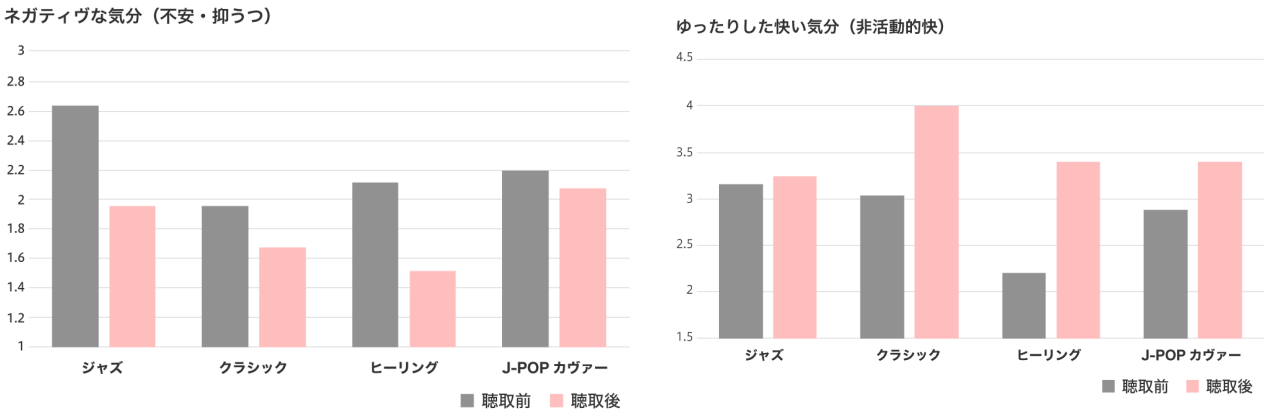
Worldwide, an estimated 792 million people—one in ten—live with a mental illness. One in five is a child. Despite the fact that anyone can develop a mental illness, in approximately 60 countries across Asia, Africa, Europe, the Middle East, South America, and North America, individuals ranging from children as young as 10 to adult men and women are chained or confined in limited, unsanitary, cramped spaces for weeks, months, or sometimes years. In Japan too, the number of people with mental illness is increasing annually, reaching 6.14 million in fiscal year 2020, with 280,000 hospitalized. To address this issue, this study considers whether mental illness can be treated more easily. Furthermore, in my research last year, I studied music therapy and stress reduction, and I thought the findings from that research could be applied.

1-2. Previous Research

As prior research, there is the study “The Effect of Music on Enhancing Human Immunity” by Professor Emeritus Haruhisa Wago of Saitama Medical University Junior College. In it, Wago (2021) found that:

> Music plays a significant role in maintaining health by enhancing humans' weakened mucosal immunity and overall immunity. It also promotes mental relaxation and a sense of well-being. Therefore, such music can be considered an effective and readily available tool for preventing infectious diseases like viruses that invade through mucosal surfaces.

As the proverb “Prevention is better than cure” suggests, it is highly meaningful and promising to make extensive use of effective music that boosts human immunity in daily life.



Source: Haruhisa Wago, “The Effects of Music on Enhancing Human Immunity”

This demonstrates that music is not only effective for mental illness but also beneficial for maintaining health. Further benefits may be expected in regions such as Africa and the Middle East, where medical technology is less developed. These findings are applied as a foundation for this study.

1-3. Research Question (RQ)

My research question is: “How can we encourage more hospitals to adopt music therapy?” Currently, the number of hospitals offering music therapy remains low worldwide, and it cannot be said to be widely adopted. While music therapy is not yet widespread in Japan, countries like the United States and Germany are considered leaders in this field. There, music therapy is recognized as an effective treatment, leading to diverse opportunities for music therapists. This study therefore examines examples from the United States and Germany in order to develop possible approaches.

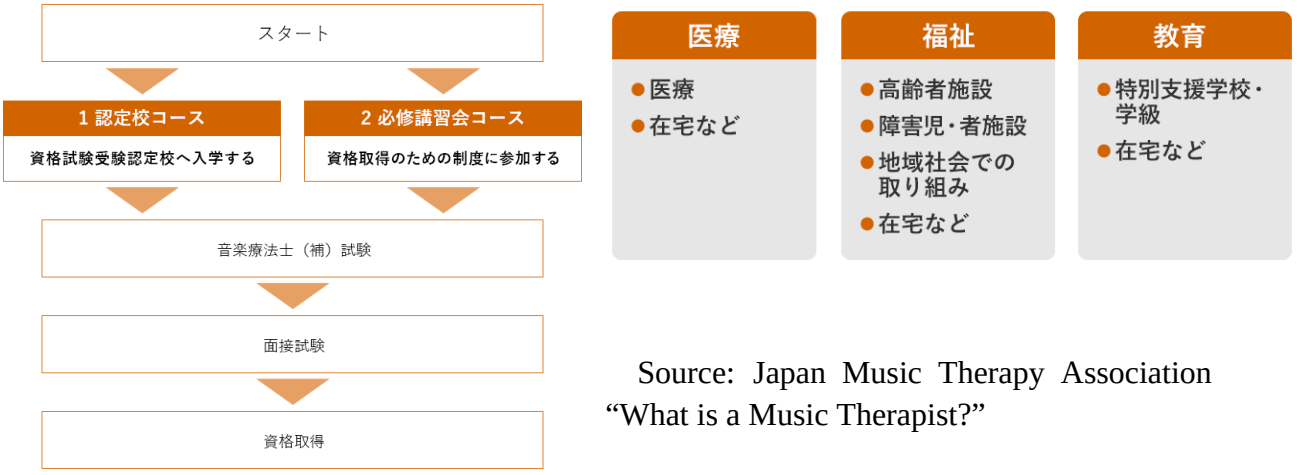
1-4. Hypothesis

Currently, few hospitals worldwide incorporate music therapy. Two main reasons can be identified: ① the low level of awareness about music therapy, and ② the scarcity of music therapists.

Regarding the first issue, “low awareness of music therapy,” it is thought that the fact that the effectiveness of music therapy is not widely recognized plays a significant role. Currently, music therapy cannot be said to be widespread; in Japan, it is only adopted in a limited number of hospitals. This problem is thought to stem from the low awareness of music therapy in Japan.

Regarding the second issue, “the shortage of music therapists,” in Japan today, the music therapist qualification is a private certification granted by the Japan Music Therapy

Association, with an average exam pass rate of around 62%. To obtain this qualification, one must enroll in a school accredited to offer the music therapist qualification exam and undergo at least three years of systematic study in music therapy. Additionally, beyond the Japanese Music Therapy Association, music universities offering “Music Therapy Courses” or “Music Therapy Majors,” as well as vocational schools with music therapist training programs, exist. Some schools also allow qualification acquisition through a combination of correspondence education (online delivery) and on-campus sessions. However, while pathways to becoming a music therapist are available, awareness remains low. Therefore, I intend to advance research to increase this recognition.



Source: Japan Music Therapy Association “What is a Music Therapist?”

Another reason for the shortage of music therapists is low pay. Despite the long period of study required to obtain certification, the low salary is thought to contribute to the scarcity of music therapists in Japan. Music therapists are typically freelancers who must actively seek out work themselves, making it difficult for them to increase their income. This issue could also be resolved by raising awareness of music therapy and encouraging more hospitals to incorporate it into their practices.
Therefore, as hypotheses to address the research question, I propose the following solutions: ① Widely publicize the medical efficacy of music therapy, and ② Improve the certification system for music therapists.

2. Research Method

As methods for verifying the hypothesis, the following approaches can be considered: ① Investigating the current state of music therapy and ② Examining the issues with current qualifications. Data for this study are collected through literature review and online sources.

3. Results and Discussion

First, the current state of music therapy was examined. Music therapy is broadly categorized into passive music therapy, which primarily involves listening to music tailored to an individual's symptoms, and active music therapy, which centers on singing or playing

music. The former helps patients relax, calms their mental state, and alleviates anxiety, while the latter offers a wide range of benefits, such as improving children's concentration and supporting rehabilitation for the elderly. An example of an institution incorporating music therapy in Japan is the Kyoto Medical Center. On the Kyoto Medical Center's official website,

> Dementia is a disease that places significant burdens on both patients and their families. It involves core symptoms such as memory impairment and diminished judgment, along with BPSD symptoms like hallucinations, agitation, and wandering.
> Music therapy utilizes music's relaxing effects and its ability to evoke memories in treatment, and is considered particularly effective for BPSD.
> While music therapy is often conducted in group settings for facility residents, a major feature of our hospital is that we primarily provide individual therapy to homebound patients in an outpatient setting, a nationally rare approach.
> The Flash Song Therapy method involves singing nostalgic songs from memory one after another to stimulate the brain and body, eliciting feelings of satisfaction and excitement in patients. For those who find singing difficult, we incorporate other physical expression methods like playing instruments or dancing.

It is stated that Kyoto Medical Center employs a treatment method called flash song therapy. This involves a music therapist playing songs popular during the elderly dementia patient's youth or songs the patient personally enjoys, encouraging the patient to sing along. This therapy is said to stimulate the part of the patient's brain responsible for memory, alleviating hallucinations, agitation, and memory impairment.

Additionally, we investigated the current state of music therapy in the United States. The U.S. is considered the birthplace of modern music therapy, where it is widely practiced. In the U.S., music therapists hold national certification. Music therapists work in diverse settings, including educational institutions like schools, healthcare facilities, senior care centers, private practice, children's centers, and prisons. In recent years, large corporations have also employed corporate music therapists to address employees' mental distress and anxiety. The catalyst for music therapy's spread in the United States was World War II. During the war, music therapy was used as a treatment for the physical and psychological suffering of returning soldiers. Doctors and nurses at U.S. Veterans Hospitals noticed emotional and physical changes in hospitalized patients when musicians came to perform. Subsequently, the Music Therapists Association was established in 1950. The current number of music therapists is approximately 7,500. In the U.S., certification systems are generally established at the state level rather than nationally. To obtain this certification, one must study at a university approved by the American Music Therapy Association and complete its curriculum. Music therapy certification is issued by a single organization, the Certification Board for Music Therapists (CBMT). Therefore, when someone claims to be a certified music therapist, it clearly indicates the level of training they have undergone and the qualifications they hold. Regarding the working environment, in the United States, many music therapists work in hospitals and rehabilitation facilities, where the working environment is well-established.

Additionally, we investigated the current state of music therapy in Germany. Music therapy

developed rapidly in Germany during the 1700s. Since then, trained music therapists have worked as professionals, providing non-pharmaceutical treatments covered by health insurance. The German Music Therapy Association has approximately 1,500 members. Although the number of association-related personnel is small, the system is well-established throughout Germany. A distinctive feature in Germany is that music therapy is incorporated into health insurance, making it affordable and accessible. Furthermore, music therapy is a nationally certified profession in Germany, with qualifications divided into the following two categories:

A) Certified Music Therapist

This certification is available to those who major in music therapy at university, enabling them to take the exam and secure favorable salary conditions.

B) Music Therapist

This designation can be obtained by studying at private institutions without taking the certification exam, or by pursuing music therapy as a minor.

Looking at these examples, I concluded that to promote the wider adoption of music therapy globally, it is crucial to establish music therapy as a nationally certified profession, develop a structured educational system, and ensure music therapy is covered by insurance.

Next, we investigated the issues with the current qualifications. Currently, music therapists hold private qualifications, which can be broadly categorized into the following three types.

A) Local Government Certification

Exists in Nara, Gifu, and Hyogo Prefectures, each stipulating its own training and certification methods.

B) Music Therapist Type 1 and Type 2

Certifications granted by the National Music Therapist Training Council (established in 2000 by music university and junior college personnel to train music therapy practitioners). Awarded upon graduation from a university or junior college with a prescribed training program after acquiring the required number of credits.

C) Music Therapist

A certification qualification by the Japan Music Therapy Association. Requires full membership in the Japan Music Therapy Association, along with knowledge, musical skills, and a minimum period of clinical experience. Obtained by passing the music therapy examination.

The problem with this certification system is that it has three distinct types of qualifications, each governed by different rules. This makes it difficult to unify the system. Furthermore, unlike in the United States or Germany, there is no system where holding a qualification leads to higher income. Increasing the number of music therapists will likely require raising their income levels.

3-2 Discussion（考察）

The results suggest that low awareness contributes to the low adoption rate of music therapy. Therefore, increasing awareness should be considered an important strategy. In addition, this study suggests that combining music therapy with existing medical treatments may enhance its effectiveness and accessibility.

We will combine existing therapies with music therapy to create a treatment approach that better meets people's needs.

4. Conclusion and Future Prospects

This study concludes that establishing music therapy as a nationally certified profession and including it in health insurance systems would promote its wider adoption and enable music therapy to be covered by insurance. The benefits include smoother provision of music therapy services and increased user numbers. Since individuals meeting certain standards can provide music therapy at lower costs, users can also receive music therapy with greater peace of mind. Furthermore, I believe that making music therapy a nationally certified profession could potentially resolve the issue of low wages. Additionally, it is expected to raise the social recognition of music therapy and lead to its wider dissemination. However, establishing a national certification requires enacting legislation, and enacting legislation necessitates submitting the legal text to the Diet. Collaboration with Diet members is therefore essential.

Furthermore, I considered that the number of music therapists could potentially increase if individuals already holding a medical license were able to obtain new qualifications as music therapists. Those with medical knowledge would not need to learn everything from scratch, and it would likely be easier for them to identify patients requiring music therapy. I intend to continue researching this idea while verifying its practical feasibility. However, this study relies mainly on secondary sources, and further empirical research is required.

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How can we resolve the disparities in the World Championships?

～To create an equal world～

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Abstract
I think about the economic differences between countries in the Olympics. I realized that there is a big difference between developed and developing countries in the Olympics. Therefore, I aim for equality in the way that developed countries help developing countries.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

The goal of the Olympics is world peace and human development through sports. However, currently, various issues such as racial discrimination and gender discrimination have become problems.

1-2. Previous Research

1. Bernard's study shows that a nation's Olympic success is strongly influenced by its economic resources and population size. Wealthier countries can invest more in training, facilities, and athlete development, leading to higher medal counts. Larger populations also increase the chance of producing elite athletes. However, some smaller or less wealthy nations outperform expectations through effective sports policies or targeted investment. Overall, Olympic results reflect global inequalities, but strategic planning can partly reduce these disparities.

1-3. Research Question (RQ)

How can we address the disparities between countries in major international sporting events that are currently problematic?

1-4. Hypothesis

Although the Olympics promote peace and equality, discrimination continues to appear in many forms. This gap between ideals and reality comes from several structural factors.First, the Olympics reflect the world's existing inequalities. Countries differ in wealth, social values, and opportunities. As a result, issues such as gender bias, racial prejudice, and economic gaps naturally show up in training conditions, athlete selection, and media coverage.Second, political and economic interests influence the Games. Hosting the Olympics is closely tied to national pride and financial gain. Wealthier nations can invest more in technology and athlete development, which creates unequal conditions even without intentional discrimination.Third, the Olympic system has institutional limits. Many organizations—national committees, sports federations, and local governments—are involved. Because their rules and priorities differ, responses to discrimination are not always consistent or effective.Finally, historical traditions of the Olympics still affect the present.

Early Games were shaped by Western and male-centered values, and some of those structures remain.In short, discrimination persists because the Olympics mirror global society. Yet recognizing these problems allows the Games to push for gradual change toward true equality.

2. Research Method

Reviewing the world's leading research to investigate what the problems have been up to now

3. Results and Discussion

Major international sporting events consistently reveal substantial disparities in performance across countries, and a wide range of empirical research attributes these differences to structural conditions rather than inherent athletic potential. Quantitative studies demonstrate that national economic capacity plays a statistically significant role: a 10% increase in GDP per capita is associated with roughly a 6.9% rise in expected medal counts when population is held constant, indicating that resource availability directly shapes competitive outcomes. Similar patterns appear in analyses of delegation size, with evidence showing that an expansion of 100 athletes in a national team corresponds to an estimated increase of 6.3 medals, highlighting the influence of institutional scale on performance. These data collectively illustrate that disparities emerge from unequal access to training infrastructure, sports science, coaching expertise, and long-term athlete development systems. Based on these documented relationships, this paper advances the following hypothesis: if international governing bodies adopt data-driven redistribution mechanisms—such as increased financial assistance for low-income nations, standardized global coaching-education frameworks, and expanded opportunities for participation in high-performance training environments—then cross-national performance gaps will narrow, because the key variables correlated with medal outcomes are themselves modifiable through targeted investment and institutional support. This hypothesis relies solely on established statistical findings and internationally recognized trends, positioning resource equalization as a viable pathway for reducing disparities in major sporting events.

3-2 Discussion（考察）

Persistent disparities in major international sporting events are primarily the result of structural inequalities in national resources, including economic capacity, sports infrastructure, and long-term athlete-development systems. Quantitative research demonstrating strong correlations between GDP, delegation size, and medal outcomes indicates that performance differences reflect systemic resource distribution rather than individual athletic potential. Consequently, narrowing these gaps requires internationally coordinated measures that directly target these structural constraints—such as expanding development funding for low-income countries, unifying coaching-education standards, and increasing access to high-performance training programs. Because these interventions address the specific variables most closely linked to competitive success, they represent the most evidence-based pathway for reducing cross-national disparities in global sporting events.

4. Conclusion and Future Prospects

There are many problems in the world, but I think that by addressing such difficult issues on the stage of the Olympics, which attracts the attention of many people around the world, we can get many people to recognize the problems as problems. I would like to continue thinking about this issue.

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What are the international disparities caused by English education

~To bridge the gap between nations~

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Abstract
Differences in English education among developed countries lead to economic disparities reflected in average income. By examining previous studies and educational methods used in the Netherlands, this study aims to promote English songs, games, and stories using characters for children in three developed countries in particular—Japan, South Korea, and Turkey—in order to increase bilingual rates and reduce international disparities.

1. Introduction (Background, Significance, and Purpose)

Currently, approximately 60% of the global population is bilingual, meaning they can speak two or more languages. However, the proportion varies significantly between countries: some, like Japan, have a bilingual rate below 30%, while others, such as the Netherlands, exceed 90%. Such substantial disparities between countries can lead to educational inequalities and impact social interactions. To eliminate these differences, English is considered the ideal global lingua franca. Consequently, the development of English education in monolingual countries where English is not the native language is urgently needed. Therefore, this research explores methods to widely promote English education and the benefits it brings.This research focuses on developed countries,examining previous research and the initiatives undertaken in each nation, with the aim of raising overall English proficiency across the developed world. It also investigates issues such as economic disparities caused by differences in English education among countries, and seeks to propose solutions to these problems.

1-1. Social Context (Current Situation and Problems)

When comparing with the ranking of average incomes around the world, I found a trend in which countries with higher English proficiency levels tend to have higher average incomes. This can be considered an example of international economic disparities caused by differences in English education among countries. Since large economic gaps between nations may lead economically less affluent countries to become dependent on wealthier ones, it is necessary to narrow these disparities.

1-2. Previous Research

『language development and education』Paula Menyuk
According to this research, I knew “Children develop most in terms of language before entering elementary school and during their time in elementary school“.Based on these points my research will move toward exploring effective ways to promote English education for children before entering elementary school and those in elementary school

1-3. Research Question (RQ)

What is effective English education for children before entering elementary school and for those in elementary school, and how can it be promoted in non English speaking developed countries.

1-4. Hypothesis

The bilingual rate in the Netherlands is 94 percent, and the country ranks first in the EF English Proficiency Index. My research showed that children in the lower grades of elementary school learn English through songs, games, and stories in an enjoyable way. From this, I believe that English education during elementary school is effective, as suggested in previous studies.

In addition, the average annual income in the Netherlands is about 1million yen higher than the world average(9th highest in the world), which aligns with the trend that countries with higher English proficiency tend to have higher average incomes. On the other hand,Japan, which ranks 96th in the EF EPI, has an average income that is about 1 million yen lower than the world average.

By demonstrating the economic benefits to other non-English-speaking developed countries and presenting the effectiveness of methods such as songs, games, and stories used in Dutch elementary schools, I concluded that my research question can be addressed.

2. Research Method

Compare the EF EPI with global average income trends from Global Note.

Review previous studies.

Investigate the specific English education practices in countries that rank highly in the EF EPI.

3. Results and Discussion

3-1 Results（結果）

The period before entering elementary school and the years spent in elementary school are the most suitable for language acquisition.

In the Netherlands, the bilingual rate is 94%, and the country ranks first in the EF EPI.

In the Netherlands, English education using games, songs, and stories is introduced from the lower grades of elementary school.

The national average annual income is about 6.3 million yen, which is approximately 1 million yen higher than the world average, ranking ninth in the world.Similarly, Australia, which ranks third in the EF EPI, has the 6th highest average income in the world, and

Norway, which ranks fifth in the EF EPI, has the 7th highest average income globally.Japan, which ranks 96th in the EF EPI, has an average income that is about 1 million yen lower than the world average.

3-2 Discussion（考察）

Countries with a high EF EPI tend to have relatively high average incomes.
In other words, when many citizens can speak English, the country becomes wealthier.
This suggests a positive cycle in which a wealthy country can spend more on English education, which in turn increases the number of people who can speak English.I thought that among developed countries, those with a low EF EPI are affected by public attitudes. In monolingual countries such as Japan, people do not strongly feel the need to speak English. This low awareness of the importance of English should be addressed by highlighting the issue of economic disparities and working to improve attitudes toward English learning.

4. Conclusion and Future Prospects

International disparities caused by English education are essentially economic disparities. In fact, countries with a high EF EPI, which is an index of national English proficiency, tend to have higher average incomes. On the other hand, countries with a low EF EPI tend to have lower average incomes.To reduce these international economic disparities, I believe it is important to spread effective English education to countries with a low EF EPI. However, it is unrealistic to implement this in all developed countries with low EF EPI scores. Therefore, I decided to focus specifically on Japan, South Korea, and Turkey, and to promote effective English education in these three countries.The reason for selecting these countries is that although all of them have introduced English education from elementary school, they have not achieved significant results. Referring to the Netherlands, I conclude that the most effective approach would be to create English songs, games, and stories using characters that are popular in each country, and to build an environment where children can enjoy learning English while having fun.

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Functional Requirements of Flying Cars Toward Global Deployment

Key Requirements for the Worldwide Use of Flying Cars

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Abstract

This study investigates the essential safety functions required for the urban operation of flying cars. While previous research highlights various technical and social hurdles, the specific requirements for safe navigation in densely populated areas remain a critical area of inquiry. This research aims to identify which functions are most vital for ensuring safety in complex urban airspaces. The hypothesis posits that advanced obstacle-detection sensors and AI-driven real-time predictive systems are indispensable. Through a comparative analysis of government reports, corporate documentation, and academic literature, three core functions were identified: obstacle-detection sensors, real-time AI flight control, and vehicle-to-vehicle communication systems. The findings suggest that the integration of these technologies is necessary to mitigate risks in urban environments. The study concludes that while these technologies form the backbone of safe urban flight, future research must address system reliability and public perception.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

Flying cars, often referred to as Urban Air Mobility (UAM), have recently garnered significant attention as a transformative transport solution, particularly following demonstrations at events like Expo 2025. They offer a promising alternative to alleviate chronic traffic congestion in megacities where ground infrastructure has reached its capacity. However, urban flight introduces unique challenges, including navigation around high-rise buildings, restricted airspaces, and volatile micro-weather patterns. Furthermore, as these vehicles are intended for mass public use, the implementation of fail-safe systems is paramount. Managing three-dimensional traffic is inherently more complex than traditional road traffic; thus, identifying essential safety functions is a prerequisite for widespread adoption.

1-2. Previous Research

Existing literature has primarily focused on the structural engineering of flying cars, such as the use of lightweight composites, distributed electric propulsion (DEP), and battery efficiency. Comparative studies often distinguish flying cars from conventional helicopters or drones by highlighting their vertical take-off and landing (VTOL) capabilities and reduced noise profiles. Nevertheless, there is a relative scarcity of research focusing specifically on "system-level" safety within dense urban corridors. Studies regarding the synergy between AI-driven monitoring and sensor fusion remain limited. Consequently, there is an urgent need to shift focus from individual vehicle mechanics to integrated safety systems.

1-3. Research Question (RQ)

The main research question of this study is: “What functions are needed to keep flying cars safe when they fly in urban areas?” This question is important because cities have many buildings, changing weather, and many vehicles moving at the same time. To understand how flying cars can operate safely in such environments, it is necessary to identify the key technologies and systems that will be required.

1-4. Hypothesis

The hypothesis of this study is that safe urban flight necessitates two primary pillars: advanced sensors for hazard detection and AI systems for real-time motion prediction. Sensors are expected to prevent collisions by identifying obstacles, while AI facilitates orderly traffic flow in congested airspaces. Together, these functions are hypothesized to significantly enhance urban flight safety.

2. Research Method

This study employs a comparative literature review to identify necessary safety functions. Data was synthesized from three primary sources: government policy roadmaps, industry white papers from leading UAM developers, and peer-reviewed academic articles. The study categorized the safety features mentioned across these sources and identified the most frequently cited requirements essential for urban environments.

3. Results and Discussion

3-1 Results（結果）

The results of this study show that three safety functions appear most often in the sources: obstacle-detection sensors, real-time AI flight control, and communication systems that let flying cars share location information with each other. Many reports explained that sensors help avoid buildings and other vehicles, AI helps choose safe paths, and communication systems reduce the chance of accidents in busy city airspace.

3-2 Discussion（考察）

The results support the hypothesis that integrated technology—rather than a single isolated feature—is the key to safety. While sensors provide immediate environmental awareness, AI systems add a layer of "predictive safety" by calculating potential risks before they manifest. However, the discussion must acknowledge that AI performance may degrade in hyper-congested scenarios where hundreds of vehicles operate simultaneously. Moreover, the necessity of communication systems suggests that flying cars cannot operate as "islands"; they must be part of a connected ecosystem. A current limitation is that most findings are based on simulations; therefore, real-world empirical data remains essential for validating these systems.

4. Conclusion and Future Prospects

In conclusion, the successful deployment of flying cars in cities depends on the robust integration of obstacle detection, AI-driven control, and inter-vehicle communication. These functions are vital for navigating the complexities of urban airspaces. Future research should prioritize the "system reliability" of these technologies under extreme weather conditions and explore "public acceptance," as the success of UAM depends not only on safety but also on how comfortably society embraces the idea of vehicles flying overhead.

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How to protect Amazon Forest (14 pt)

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Abstract

Global warming is now a major issue worldwide, and deforestation is one of its primary causes. This study focuses on the Amazon rainforest, where deforestation is severe in key cultivation areas for crops like coffee.

Why does deforestation occur in the first place? Research shows cleared land is mainly used for farmland, pasture, and mining development. So why is illegal, excessive logging happening? It turns out this is deeply linked to poverty. Brazil's poverty rate is significantly higher compared to developed nations. Many impoverished farmers resort to slash-and-burn agriculture.

To address this root cause, I propose solutions from three perspectives: 1. Establishing monitoring systems to prevent illegal logging; 2. Exploring sustainable agricultural methods that also increase income.

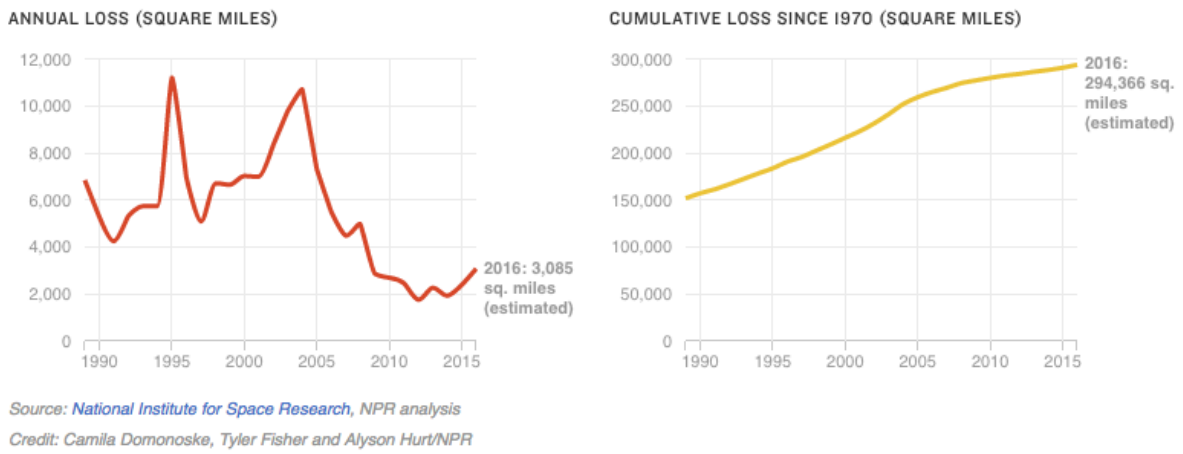
Regarding 1, efforts are currently underway to provide monitoring systems to forest conservation groups. I believe that by promoting cooperation and attracting environmental protection groups and companies in the Amazon region, and collaborating on technological development, we can create an even better monitoring system.

Regarding 2, I recommend introducing agroforestry to local residents. Agroforestry involves cultivating multiple crops simultaneously within a diverse forest system, rather than planting a single crop. It is essentially the integration of forestry and agriculture. A notable example of miraculous recovery through this method is the city of Tomé-Açu in Brazil. Using agroforestry is environmentally friendly and also promises increased income. Furthermore, it requires no large initial investment, making it highly accessible. Therefore, to promote agroforestry, we aim to develop appropriate agroforestry methods by consulting local residents and experts, and then spread awareness through direct outreach and distributing informational materials.

Future research challenges include determining the feasibility of actually implementing agroforestry and whether promoting it solely through outreach and distributing materials is truly achievable, as this approach may lack realism.

1. Introduction (Background, Significance, and Purpose)

The Amazon rainforest in Brazil is one of the world's most precious forests. However, as development progresses, the forest is being lost. Looking at the right side of Figure 1, the cumulative area of forest loss continues to increase, suggesting that efforts to maintain or increase forest area, such as through reforestation, have not progressed significantly. Furthermore, the left side of Figure 1 shows that the annual area of forest loss fluctuates greatly from year to year, with particularly high losses in 1995 and 2005, and a decreasing trend now.

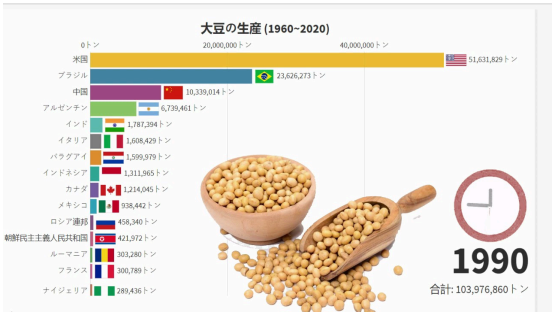


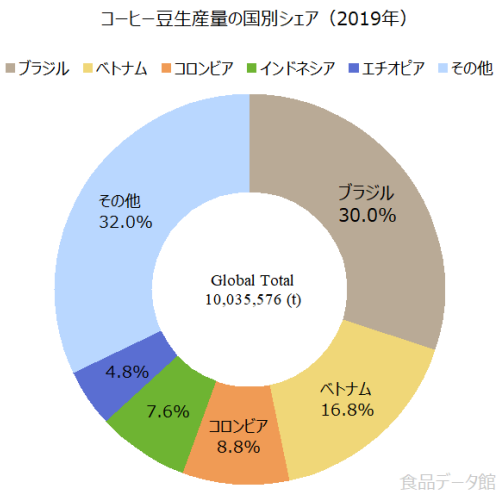
Source: National Institute for Space Research, NPR analysis

Credit: Camila Domonoske, Tyler Fisher and Alyson Hurt/NPR

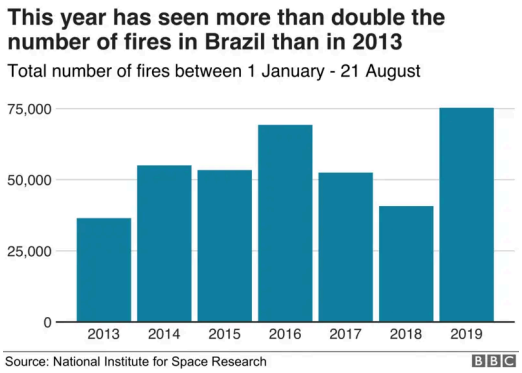
The primary cause of deforestation is land conversion for agriculture and livestock farming, specifically for farming and grazing. As shown in Figure 2, sugarcane, soybeans, and coffee beans hold a high global market share and are considered major crops. Producing these crops requires vast amounts of farmland. Furthermore, it is believed that the expansion of soybean cultivation, particularly in the southern Amazon region, has driven the encroachment of Amazon rainforests northward.

According to an AFP report published in 2021, 94% of deforestation is illegal logging. This reveals the current state of inadequate forest management.





1-1. Social Context (Current Situation and Problems)
In recent years, forest fires have also become frequent. Influenced by governments prioritizing development, such as slash-and-burn agriculture, over environmental protection, fires set to clear forests for farmland sometimes spread out of control. Damage is particularly severe in northern Brazil, and the impact is spreading to neighboring countries as well.



1-2. Previous Research
https://matt-english.com/podcast/20241210

Deforestation in Brazil is largely driven by poverty. Poor people cannot find high-paying jobs, and even if they want to farm, they lack fertilizer. So they burn forests and use the ashes as fertilizer for agriculture. In impoverished regions, populations tend to grow, and this population increase further exacerbates food shortages.

1-3. Research Question (RQ)
What measures are necessary to simultaneously achieve forest conservation and improve residents' livelihoods?
＜Significance of the Research＞
First, it can protect valuable wildlife inhabiting forests. Even if reforestation occurs, if the quality or species composition of the local forest changes, the animals living there may no longer be able to survive. Therefore, we must strive to be mindful of such environmental considerations.
Furthermore, it contributes to preventing global warming, which is now a major problem. By conserving forests, we can curb the increase in carbon dioxide.

1-4. Hypothesis
The primary causes of deforestation are excessive grazing, slash-and-burn agriculture, and development. Addressing these causes can reduce the damage from deforestation. I believe sustainable development and agriculture can solve the deforestation problem while protecting

core industries. On the other hand, as the world population continues to grow, the demand for food supply will increase further, and accordingly, the need for more arable land is also expected. It is necessary to cultivate higher-value crops more efficiently on the same farmland. I would like to explore specific methods for achieving this. Meanwhile, restoring already degraded land is also crucial for forest conservation. Developed land loses nutrients and becomes degraded, requiring considerable time to return to its original state. Solutions like reforestation can increase forest cover and restore forest environments.

2. Research Method

The research will primarily be conducted online.

First, I want to investigate Brazil's economic situation and the distribution of its major industries. I will research organizations working on poverty reduction in the Amazon and examine the initiatives they undertake. Additionally, I would like to study sustainable agricultural methods from an agricultural perspective.

3. Results and Discussion

3-1 Results

We investigated the root causes of forest fires. Why do people attempt to clear forests for agriculture, such as through slash-and-burn farming? Paper 1 revealed that poverty in areas surrounding the Amazon rainforest plays a significant role. Residents suffering from poverty cannot find work and cannot afford fertilizer, leading them to choose to burn and clear forests for farming. It is thought that this problem could be solved by introducing a system that improves residents' livelihoods while implementing appropriate forest management. Furthermore, we wish to research whether there are sustainable agricultural methods available to residents that do not require clearing forests.

1. Building Management Systems

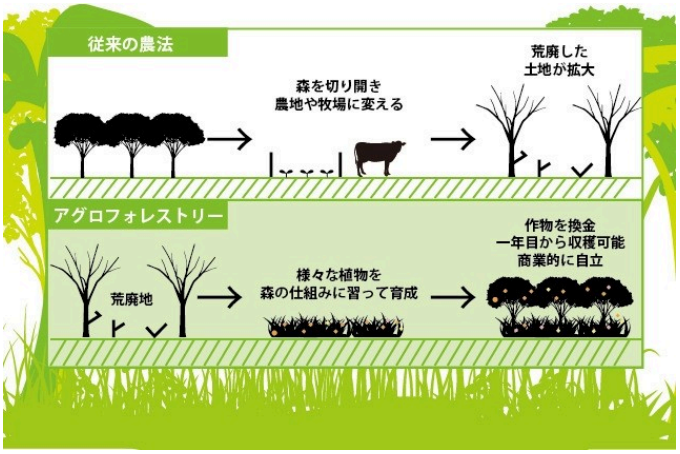
Basic forest management systems include real-time monitoring systems such as satellites and remote sensing. Managing vast forests requires large-scale, highly precise monitoring systems. Therefore, Hitachi is collaborating with the American environmental organization Rainforest Connection to develop AI-powered monitoring systems. These systems detect intruders using acoustic data and can further analyze this data to make predictions. In this

way, global corporations and environmental organizations collaborating to develop systems will likely yield even better technologies. Developing technology requires cooperation between environmental organizations and companies. To achieve this, I propose that tropical forest regions actively attract institutions developing security and surveillance systems. This should be done with a strong focus on environmental consideration, enabling the trial testing of security and surveillance functions. Forest managers would gain access to forest monitoring systems.

2. Agroforestry

To promote sustainable agriculture, agroforestry is recommended. Agroforestry is a form of agriculture that incorporates forestry practices. Primarily used to regenerate degraded land, it involves planting different vegetables and fruits alongside the main crop to cycle nutrients and enrich the soil. It enables year-round harvests of various crops, promising increased revenue while allowing for environmentally friendly organic farming. Success requires a long-term commitment of 5 to 10 years and a minimum level of foundational knowledge.

A representative city that has succeeded with agroforestry is Tomé-Açu, Brazil. Here, pepper cultivation once brought immense wealth, but the environmentally unsustainable methods led to devastating losses from disease. Introducing agroforestry not only restored pepper production but also enabled year-round cultivation of vegetables and fruits. Some farmers reportedly saw their income increase fortyfold. This case demonstrates the potential of agroforestry. Therefore, introducing agroforestry in the Brazilian Amazon rainforest region holds promise for increasing farmers' income while maintaining agricultural production.



3-2 Discussion

Agroforestry as a strategy for carbon sequestration

https://onlinelibrary.wiley.com/doi/abs/10.1002/jpln.200800030

We aim to advance the use of AI in our surveillance systems. In recent years, AI has evolved rapidly, and many surveillance systems utilizing AI have begun to be developed. By employing AI for efficient monitoring, we can not only prevent illegal logging but also detect forest fires early and respond promptly.
Additionally, to promote agroforestry, I want to create educational programs for farmers. Challenges with agroforestry include the difficulty for non-experts due to the need for specialized knowledge and the long time required. To help them understand and overcome these challenges, I want to organize government-administered educational programs. Furthermore, I want to consider a system where government subsidies are provided until agroforestry becomes established

4. Conclusion and Future Prospects
To help people understand agroforestry, I recommend creating a manual. Distribute it for free, clearly outlining methods and key points for gradually transitioning farming practices to agroforestry. Encourage a shift toward more environmentally friendly agriculture, even if only slightly. I believe a gradual transition eliminates the need for large initial investments, making it easier to start. Distributing it on paper keeps costs low. I want to create the manual with input from people knowledgeable about the local climate and farmers who can advise on which crops are suitable for simultaneous cultivation and how.

This study revealed that practicing sustainable agriculture can reduce illegal deforestation and even alleviate poverty. What was particularly surprising was discovering that poverty itself is a cause of deforestation. People suffering from poverty clear forests to farm. Selling cheap timber then further perpetuates the vicious cycle of poverty. I believe agroforestry is an excellent solution to break this cycle.
However, it remains unclear whether agroforestry can be implemented worldwide. The Amazon is a tropical region with limited suitable crops for cultivation. Can diverse crops be grown there and converted into income? This is something I wish to investigate in future research.

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あんこ **to Anko**

～for people who play sports～

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Abstract

This study explores the nutritional potential of anko (sweetened red bean paste) as a recovery-support food for athletes. While external injury-treatment technologies have rapidly advanced, internal nutritional recovery remains underdeveloped. Because anko is rich in dietary fiber, plant-based protein, vitamin B1, iron, and polyphenols, it may contribute to faster recovery and injury prevention. However, anko is not widely recognized outside East and Southeast Asia. By examining international food cultures and developing globally acceptable anko-based products, this research proposes the "WANKO Project," a strategy to promote anko worldwide and support athletes through accessible nutrition.

1. Introduction (Background, Significance, and Purpose)

I have had experience struggling with my injuries because I'm a member of the track and field club. Also people who play sports at the Olympic Games and the World Championships are active with struggling injuries. However, it takes a lot of time to get over them because we are limited in our time to practice and need the time to come back to our lost physical strength. Therefore, I started to think about them but the technology is developing. So, it has arranged technology from outside of our body. There are a lot of machines to heal injuries. And I want to try approaches from inside using foods to recover and prevent injuries.

I paid attention to Anko because they have a lot of nutrients such as dietary fiber, protein ,vitamin B and polifenol. For this, we expect to recover and prevent it quickly. Anko has not spread all over the world. So I want to know anko from all over the world.

1-1. Social Context (Current Situation and Problems)

	あんこ30g
エネルギー(kcal)	72
タンパク質(g)	1.7
脂質(g)	0.2
炭水化物(g)	16.2
カルシウム(mg)	6
鉄(mg)	0.5
ビタミンB1(mg)	0.01
ビタミンB2(mg)	0.01
ナイアシン(mg)	0.0
ビタミンB6(mg)	0.01
葉酸(μg)	2
パントテン酸(mg)	0.05
ビオチン(μg)	0.5

In recent years, "food training" (shoku–training), which focuses on nutrition management for athletes, has gained popularity. As the idea of maintaining optimal physical condition through efficient nutrient intake has spread, new nutritional strategies have emerged. Within this context, I focused on anko—sweetened red bean paste commonly associated with traditional Japanese confections.

Despite these benefits, anko consumption remains largely limited to East and Southeast Asia, including Japan, China, Taiwan, Vietnam, Korea, and Thailand. One major barrier is cultural: many people around the world find the idea of "sweet beans" unusual or unappealing. Nevertheless, considering anko's nutritional potential, I aim to promote it internationally. Thus, the first objective of this research is to explore how anko can be introduced and accepted globally.

1-2. Previous Research

A notable example of innovation is the Anko, a drinkable anko product developed by Tsukiji Juice Works. Packaged similarly to a juice pouch, it has even been used as a “Hero Award” during professional baseball games between the Fukuoka SoftBank Hawks and the Chiba Lotte Marines, gradually increasing public recognition. Unlike traditional confectionery-style anko, the ANko is formulated with reduced sugar content, making it more suitable for athletes seeking convenient and tasty nutrition. However, the product is still not widely consumed in Japan and remains far from becoming a global staple. To share anko with the world, further strategies for expansion and acceptance are required.

1-3. Research Question (RQ)

How can anko be promoted worldwide to support athletes?

Anko is suitable for nutrition-focused dietary training because it allows athletes to consume necessary nutrients more easily and enjoyably. In addition, because anko is plant-based, it can be consumed by vegetarians and individuals with religious dietary restrictions. Thus, anko has potential as an inclusive and universally accessible nutritional food.

1-4. Hypothesis

An effective way to promote anko globally would be to introduce it at international sporting events where athletes from around the world gather. Since acceptance may initially be difficult, the introduction should begin with competitions held in Asian regions where sweet beans are already familiar.

2. Research Method

1.Review academic papers and research on anko, the ANko, and the nutritional properties of azuki beans.

2.Develop recipes and forms through which anko could be more easily accepted by global consumers.

3.Produce prototypes based on the proposed recipes.

4.Evaluate whether these prototypes are likely to be accepted by athletes and general consumers.

3. Results and Discussion

3-1 Results

Although often viewed merely as a dessert ingredient, anko's primary component, azuki beans, contains a wide range of valuable nutrients. First, azuki beans are rich in iron. Athletes are particularly susceptible to iron-deficiency anemia due to heavy sweating during intense training, as well as exercise-induced hemolytic anemia caused by repeated foot strikes destroying red blood cells. As a result, athletes require greater iron intake than the general population, and anko can serve as an accessible source.

Second, anko provides vitamin B1, an essential nutrient for efficient carbohydrate metabolism. It is indispensable for endurance athletes and plays a role in fatigue recovery. Third, azuki beans supply potassium, a mineral that is lost through sweat. Consuming potassium before exercise helps prevent declines in muscle performance and reduces injury risk. Anko also provides vitamin E, which contributes antioxidant effects, and functions as a plant-based protein source.

3-2 Discussion

This study aims to promote anko and support athletes through its nutritional benefits. Based on these objectives, I propose the WANKO Project, named by combining "Wa × Anko" (Japan × Anko) and "Wa × Anko" (Circle × Anko), suggesting cultural harmony and global connection.

The project consists of four target groups:

Ⅰ. professional athletes

Ⅱ. student athletes

Ⅲ. the general public

Ⅳ. social media "aesthetic appeal" audiences

I. For Professional Athletes

Two initiatives are proposed:

A.Introducing anko-based foods at global sporting events.

B.Developing protein × anko nutritional drinks.

During the Tokyo 2021 Olympics, no anko-based foods were offered in the Athletes' Village, despite emerging research showing anko's benefits. I found this absence surprising and proposed the inclusion of anko at major international competitions.

For the protein × anko drinks, I envision packaging similar to common commercial protein packs. To reduce psychological resistance among non-Asian consumers, opaque packaging should be used so that the contents are not visible—helping eliminate fear associated with unfamiliar foods.

II. For Student Athletes

For students, I propose anko drinks similar to those for professional athletes and a new product: anko jelly. This would function as an anko-based version of popular energy jelly products such as Weider-in Jelly. Like the Anko, the product should use non-transparent packaging and be portable for commuting students.

III. For General Consumers

This group includes hikers, runners, and gym users. I propose anko sticks—small, portable stick-shaped snacks that are easy to carry. Because general consumers require fewer nutrients than competitive athletes, a lighter, convenient format is appropriate.

IV. For Social Media and Aesthetic Appeal

To leverage visual appeal, I propose two strategies:

1.National Dessert × Anko Fusion

For example, France's macarons could incorporate anko as a filling. Similarly, the UK's scones or the US's whoopie pies could be made with subtle anko elements. Although this approach risks cultural resistance—mixing traditional foods with unfamiliar ingredients—it may provide a more approachable first taste.

2.The WANKO Contest

Confectionery companies worldwide would create desserts using anko and post them on social media with tags such as #WANKO or #anko. Rankings would be determined by likes and shares. This SNS-based cycle of posting—beginning with famous athletes sharing anko snacks—could spread awareness to students and the general public, forming a global "circle" of anko promotion.

4. Conclusion and Future Prospects

To answer the research question—how to promote anko globally to support athletes—I propose the WANKO Project. The project aims to expand anko awareness through social media aesthetics while supporting athletes via targeted nutritional products for professional, student, and general users.

From an overseas document, carbohydrate loading prior to competition is widely recognized as an effective strategy for enhancing athletic performance. Therefore, it is necessary to consider the optimal timing for anko consumption as part of pre-competition nutrition. Based on current observations, consuming anko before competition appears to be ideal. However, because anko contains dietary fiber, its effect on gastrointestinal comfort and digestion must be carefully examined, and further investigation is required to determine the most appropriate timing and portion size for athletes.

Future considerations include:
•Investigating whether powdered anko retains its nutritional effectiveness.
•Evaluating solubility and stability of powdered forms.
•Determining which azuki varieties and sugars are best suited for mass production.
•Clarifying why promoting anko specifically (rather than azuki beans alone) is meaningful.
Ultimately, I hope that anko will help athletes worldwide improve their conditioning and performance.

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How to Speak in Both Endangered Languages and Common Languages

～Spread words with sound～

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Abstract

There are many endangered languages in the world. Protecting endangered languages is considered important, however people have to speak a common language such as English in order to live in modern society in developing regions such as Africa. To resolve this issue, I posed the following research question and conducted research: "What kind of efforts are needed to protect endangered languages in developing countries without forcing local children to study their native language?" After investigation and consideration, I ultimately concluded that the distribution of songs in endangered languages through podcasts was the best solution.

1. Introduction (Background, Significance, and Purpose)

Preserving endangered languages is important from the perspective of cultural preservation, however people in some developing areas such as Africa have to speak a common language to get proper jobs. Then, I thought about how to protect languages while countries are developing.

1-1. Social Context (Current Situation and Problems)

According to an article, there are two main reasons why it is necessary to protect endangered languages. One is “to preserve knowledge.” Endangered languages contain much of the knowledge cultivated in the region where they are spoken. The other is "protecting identity." When a language is lost, the emotions and ethnic culture that can only be expressed in that language will no longer be passed down. Leading to a loss of solidarity between ethnic groups, possibly their identity is weaker.

The reason for protecting endangered languages is to protect the knowledge and identity of their speakers.

1-2. Previous Research

According to Hameso, Educating local languages in the Africa region has several following merits and demerits:

> *Foreign languages are used in different countries in business, diplomacy, media and scholarship. Inability to understand these languages costs resources while knowledge of them can only be an asset”*.(4)
>
> *Thirdly, foreign languages are viewed as symbols of power and a means of securing good, secure jobs”*.(4)
>
> On the other hand:

Such a system results in 'individuals hampered by linguistic deficiencies in their thinking, in their critical observation, in their questioning of ideas and facts, and in the interpretation of what is communicated to them'".(5)

However, Hameso remarked:

The general tendency to favour foreign languages as official languages and as the media of instruction is the major obstacle to the use of indigenous languages. It is a tendency that is reinforced by political and economic constraints".(6)

1-3. Research Question (RQ)

What is the way to protect endangered languages without forcing children in developing countries to speak in those languages?

1-4. Hypothesis

I thought of a suggestion that "spread the existence of endangered languages around the world and ensure that people do not forget about them." The specific idea was to publish poems and stories in endangered languages online.

2. Research Method

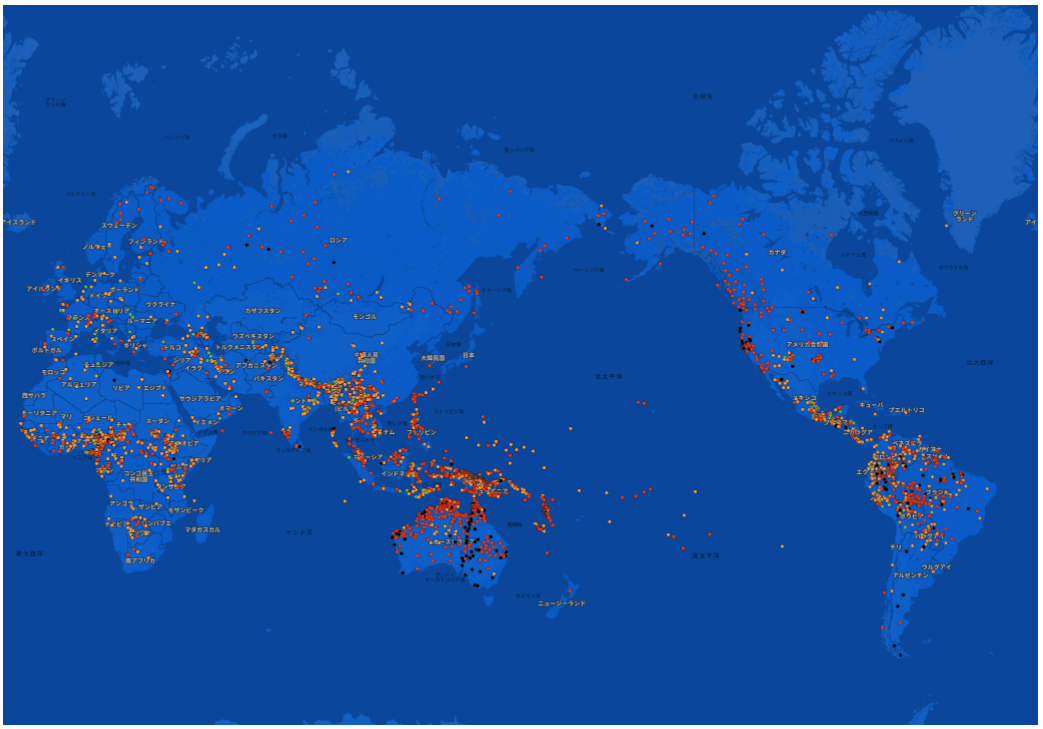
I saw the Languages Map of Endangered Languages Project and decided on the model country, which appeared the feature "developing and having lots of endangered languages" best. Next, I researched about success stories and current activities in the world and thought of some rough suggestions. I materialized them when I had questions and challenges in implementing them in the country.

3. Results and Discussion

3-1 Results

When researching language preservation, I referred to the Language Map of the Endangered Languages Project. The diagram shows each region of the world.

In this diagram, languages are displayed as dots, and the colors indicate the language's degree of risk of extinction. Green is "At risk," orange is "Endangered," and red is "Severely endangered."



English-speaking countries such as Europe and the United States have relatively few endangered languages. On the other hand, Papua New Guinea, a multi-ethnic society, has an extremely large number of languages. I believe that the reason there are areas in Africa and South America with few endangered languages is because of colonization by European countries. After referring to this diagram and a list of countries receiving ODA development assistance, I chose Nigeria as my model country.

Next, I investigated language preservation efforts around the world. A well-known successful example of language preservation is the Hawaiian language revival movement, mentioned in previous research. In addition to Hawaiian language education, this movement also included the establishment of a radio station broadcasting in Hawaiian and the transcription of Hawaiian oral myths.

Another activity is the "Wikitongues" project. According to Panigrahi (2018), "With the help of volunteers from around the world, this project involves residents reciting local folktales and events in their native language, recording the recitations and leaving a record of the events." Anyone can watch endangered languages being spoken on the Wikitongues YouTube channel.

While I was unable to find any initiatives related to endangered languages in Japan, I did find a program called "Yuru Linguistics Radio," distributed on YouTube and as a podcast, that seemed like it might spark an interest in languages. Furthermore, I found that many videos of popular songs with parodies in local dialects are posted on social media. It is unclear whether the posters are intentionally trying to protect dialects or languages. However, UNESCO recognizes dialects as languages.

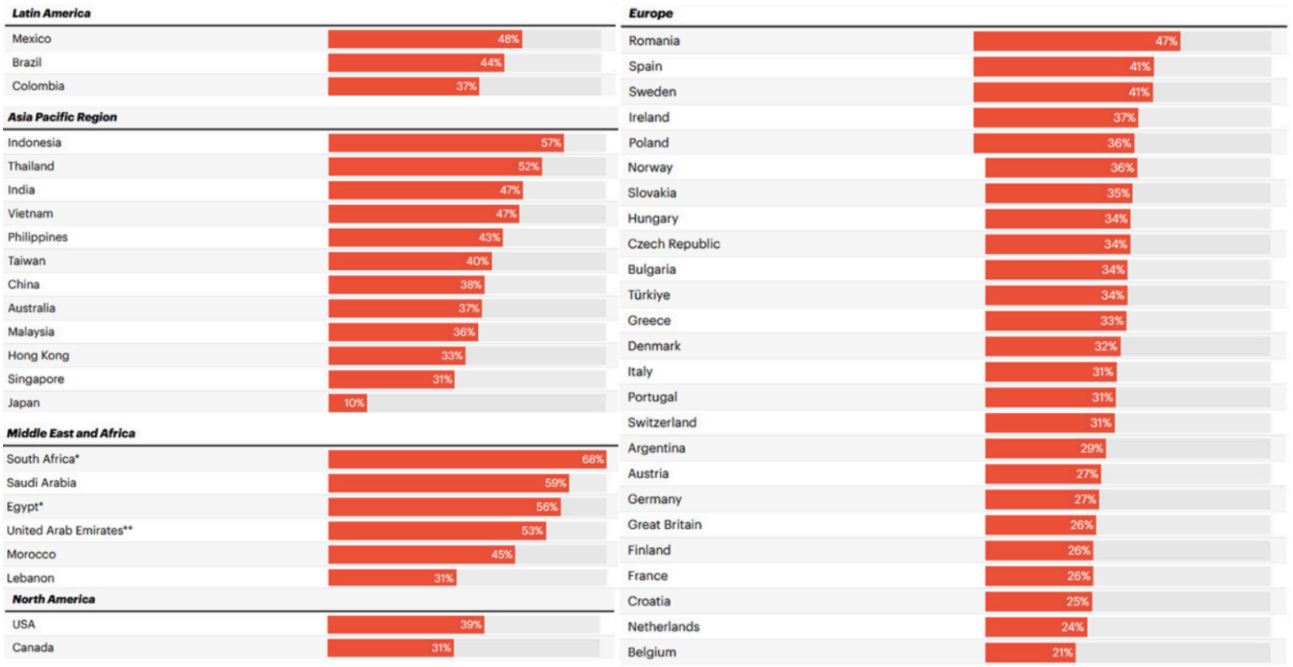
Second, I investigated what sparked interest in foreign languages. Because Japanese people learn English in compulsory education, I thought it would be difficult to

understand what sparked their interest in English, so I looked at articles written about what sparked interest in German.

I found that music was the most common reason. According to the article, specific reasons for his interest included, "I was a member of an orchestra as a hobby, and I thought learning the language was necessary to play German music," and "I was moved by the refined and elegant nature of German when I heard German tenor Peter Schreier sing Schubert's "The Beautiful Mill Girl" and the religious music of J.S. Bach and Schütz." The next challenge is deciding what media to use. I thought that, assuming that any media capable of distributing audio would be suitable, it would need to meet the following conditions: 1. Used by people all over the world. 2. Low cost. 3. Used by the developing countries with endangered languages that are the subject of my research. 1. Because information spreads more easily when more people use it. 2. Because lower costs make it easier to work on. 3. My reason for this is that I hope to invigorate language preservation activities by raising awareness of endangered languages through media dissemination. Also, although my hypothesis was that I wanted people all over the world to learn endangered languages, I also thought that it would be easier for local people to learn them.

After researching media that met these conditions, I decided that podcasts were the most suitable. This is because there are so many people using them worldwide. The graph on the previous page shows the percentage of people who listen to podcasts for more than an hour per week.

In over half of European countries, over 30% of people listen to podcasts for over an hour a week. The percentage is particularly high in countries around the Pacific and in Africa, and although it is lower in Japan, there are still countries where it exceeds



50%.

Podcasts, which are audio-only, have the advantage of being low-cost and easy to get started with, as they do not require video editing skills or much equipment, unlike YouTube. They can also be monetized by adding advertisements.

3-2 Discussion（考察）

I believe that language preservation activities should be carried out through media such as radio and the internet. However, simply spreading information about endangered languages through the media is insufficient, as it is likely that only people who are already interested in endangered languages or languages will receive the information. Therefore, I believe music is a hobby enjoyed by many people, and I thought promoting music would be a very effective way to protect endangered languages. In fact, there is a case in point: two brothers living in the Antioquia department in the northern mountainous region of Colombia recreated a rap song in their native, endangered Embera language, which ultimately led to Norway focusing on endangered language revitalization. There are also popular online videos of popular songs sung in local dialects.

The specific question was "how should we collect and distribute songs in endangered languages?", and I thought that a good idea would be for podcast producers to ask local residents to sing songs in endangered languages and then record them, as is the case with Wikitongues.

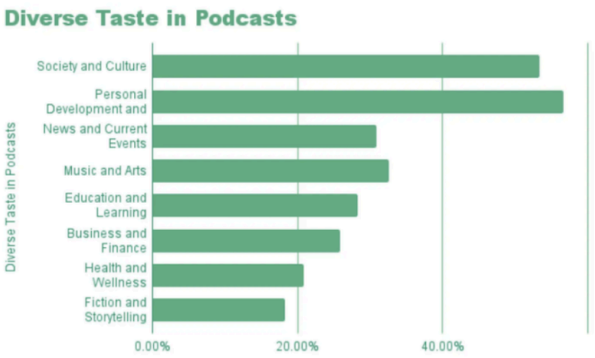
Based on those survey results, my current proposal is to "distribute songs in endangered languages or existing songs translated into endangered languages through podcasts."

4. Conclusion and Future Prospects

I formulated my research question with the stance that, "While teaching English to children in developing countries, let's spread awareness of endangered languages around the world." Taking this into account, and the current proposals, I came up with a proposal that would serve as my final conclusion.

Collect songs in endangered languages from local people, create a program that compiles the songs and their backgrounds and anecdotes, and distribute it as a podcast. I would then use a portion of the profits to hire English teachers in local schools. I named this initiative "Progress Society by Tongues At Risk," or "PSTAR" for short.

Therefore, I also investigated podcast listening rates in Nigeria. The graph on the previous page shows the frequency of podcast listening, and the popular podcast genres on the right.



The graph shows that around 35% of people listen "Regularly (multiple times a week)," meaning they listen "several times a week." We can also see that the most popular genre, after "Personal Development," is "Society and culture."

The social issue of endangered languages is difficult to understand in its importance, and fewer people are likely to be interested in it than environmental issues or war. But what if the Japanese language disappeared? Not only would this bring difficulties to the lives of Japanese people, but the disappearance of expressions unique to the language would also lead to the loss of the uniquely Japanese spirit of "mottainai" (waste not, want not) and "omotenashi" (hospitality).

The loss caused by the disappearance of a language cannot be understood until it is lost. However, there are languages in the world with few speakers. I believe that simply being aware of this fact can make a difference.

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Preventing the Extinction of Animals Worldwide

Eliminating the Introduction of Invasive Species by Humans

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Abstract

Today, many species of plants and animals are either extinct or endangered. Although numerous international studies have been conducted, no definitive countermeasure has been established due to differences in species and ecological systems. Invasive species removal has been proposed as a measure to prevent extinction, but this approach is neither effective nor humane due to concerns over animal welfare and the difficulty of disposing of captured animals.

Instead of simply trying to “reduce” endangered species, I would like to focus on increasing their populations—similar to successful examples seen in the United States.

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1. Introduction (Background, Significance, and Purpose)

Currently, an estimated 40,000 species of plants and animals become extinct every year. Most of these extinctions are caused by humans. The main factors include excessive deforestation for development, overhunting for commercial gain, the introduction of invasive species, and the effects of global warming caused by CO_2 emissions, resulting in shrinking habitats and increased interspecies conflict.

Among these factors, I identified the human introduction of invasive species as the most solvable and urgent problem. Although many developed countries have implemented various conservation programs, none have produced significant results.

1-1 Current Social Situation (Issues and Challenges)

A large number of species continue to go extinct, yet no effective countermeasures have been established. Causes include habitat invasion and predation by species entering new regions due to environmental changes, as well as the import and export of exotic animals by humans. The failure to establish effective solutions to these problems represents the greatest challenge.

1-2 Previous Research

Case: The Mongoose in Okinawa

Mongooses, members of the weasel family, were introduced to the island to control venomous Habu snakes.
However, because mongooses are diurnal and Habus are nocturnal, the strategy proved ineffective.
Furthermore, mongooses began preying heavily on native endangered and endemic species.
As a result, instead of reducing the Habu population, the introduction worsened the decline of local wildlife.

1-3 Research Question

Is it possible to develop effective measures to prevent the extinction of animals?

Explanation

The most critical issue is the extinction of animals, which has a greater impact on ecosystems compared to plant extinction. Existing strategies have shown limited effectiveness, and endangered species continue to increase. Therefore, new measures must be developed.

1-4 Hypothesis

If the inflow of invasive species from other regions can be prevented, extinctions could be reduced.

Reasons:

1. **Causes of extinction**
   In the past, overhunting by humans was a major factor. Today, international treaties and trade laws protect endangered species. Invasive species now pose a more serious threat. Because the introduction of invasive species can be controlled by humans, preventing such inflows could help reduce extinctions.

2. **Legal regulations**
   Few countries allow individuals to eradicate invasive species independently. However, many countries regulate the import and possession of exotic species, meaning prevention through law is achievable.

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2. Research Methods

- Reviewed academic papers and national/international policies on invasive species
  (Most literature focused on invasive species and their import/export regulations, indicating the importance of invasive species control.)

- Consulted related books

- Visited museums with detailed ecological exhibits

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3. Results and Discussion

Results

No concrete, widely applicable methods to reduce invasive species have yet been identified, and research in this area remains limited. Some major problems include:

Issues related to invasive species control

- **Animal welfare concerns**
  Captured invasive animals are typically euthanized, incinerated, and buried. This raises ethical concerns, especially because humans are responsible for their introduction in the first place.

- **Lack of disposal facilities**
  Incineration and landfill sites require significant space and funding, making them impractical in residential or urban areas.

- **High cost of eradication**
  Traps, labor, and transportation are expensive. It is difficult for individuals or governments to cover these costs.

- **Scale of eradication efforts**
  Eradication must remove every individual of a species in an area, otherwise the population will rebound. This is nearly impossible in real-world conditions.

Discussion

From an animal welfare perspective, invasive species should not be captured without purpose. If uses for captured animals could be found—for example, commercial use—public acceptance might improve, and profits could fund further control efforts.
However, because invasive species vary widely, this approach only applies to some cases.

Therefore, the most feasible measure is **preventing the introduction of invasive species**, as stated in the hypothesis.

Additionally, instead of focusing solely on eradication, conservation efforts should focus on **protecting and increasing the populations of endangered species**.
Reasons:

- Complete eradication of invasive species is nearly impossible
- Successful cases of breeding endangered species outnumber successful eradication cases

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4. Conclusion and Future Prospects

Conclusion

No universally effective measures exist to prevent the increase of endangered species caused by invasive species. Therefore, more research across different regions is needed to establish more broadly applicable strategies.
In the meantime, to prevent further decline, stricter management and regulation of wildlife import/export should be implemented.

Future Prospects

Although invasive species cause many problems, completely eliminating them is impossible. Thus, instead of merely trying to “stop the decline,” conservation efforts should aim to **protect and increase** endangered species—similar to the following examples:

- **American gray wolves (USA):**
  Wolves were sheltered in protected areas, treated for injury/illness, and successfully bred.

- **Bridled Nailtail Wallaby (Australia):**
  The government purchased habitat land, installed fences and nets, and supported reproduction.

Future efforts should focus on such positive conservation approaches.

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Ending Hunger with Pacific Saury

~New Aquaculture Using Genome Editing~

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【Ending Hunger with Pacific Saury】

Abstract

Global food security is currently facing a dual crisis: the drastic decline of wild fish stocks and rising hunger rates in developing regions. Pacific saury (*Cololirybis saira*), a vital marine resource in Japan, has seen a catastrophic drop in catch volume from 340,000 tons in 2008 to approximately 17,000 tons in 2022. This study explores the feasibility of utilizing land-based aquaculture and genome-editing technology to cultivate Pacific saury as a stable food source for hunger-stricken regions in Asia and Africa. By analyzing the "comprehensive supplier" model of Norway's AKVA Group and the successful tuna aquaculture programs at Kindai University, this research examines whether integrated technology transfer—including hardware, software, and educational training—can facilitate sustainable local production. The

results suggest that while the nutritional profile of Pacific saury is ideal for combating malnutrition, success depends on establishing collaborative networks between researchers and local producers to overcome high initial infrastructure costs.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

The catch volume of Pacific saury, which recorded 340,000 tons in 2008, has gradually decreased since then, dropping to 17,910 tons in 2022. Along with the decline in catch volume, fishing grounds have moved further offshore, leading to a significant increase in catches in high seas (international waters). Various causes have been cited, including changes in the path of the Oyashio Current, warm water masses blocking the southward migration of saury to the Japanese coast, a decline in stock resources, and the entry of foreign fisheries. Although various causes have been identified, no recovery in saury catch volumes is currently foreseen.

1-2. Previous Research

The AKVA Group is a well-known company referred to as a "comprehensive supplier of aquaculture equipment." What exactly is the equipment they supply? AKVA Group introduces this through clear visual imagery. They provide not only the necessary cage frames and nets for aquaculture but also automatic feeding systems for salmon, sensors to measure the cage environment, lights to control the maturation of salmonids, cameras to grasp the situation inside the fish preserves, work boats to access the cages, feeding barges (pontoons) equipped with silos that serve as the hub for feeding, and a suite of software to control this equipment and manage fish growth. While AKVA Group offers multiple types of equipment tailored to the size of the cages and the environment, and can provide appropriate combinations based on customer requests, they have not expanded into regions with high rates of hunger, such as parts of Asia and Africa. Therefore, I intend to investigate whether these systems can be adapted to those regions.

1-3. Research Question (RQ)

Is it possible to eliminate hunger by spreading safe and secure farmed Pacific saury to hunger-stricken regions overseas?

1-4. Hypothesis

Kindai University 21st Century COE Program: Research Center of Excellence for the Aquaculture of Bluefin Tuna and Other Fish. This research highlights the Bluefin Tuna aquaculture project conducted as part of Kindai University's 21st Century COE Program. Specifically, it focuses on research where the introduction of technology overseas promoted

local economic development, contributing to job creation and poverty alleviation.

2. Research Method

The AKVA Group, known as a "comprehensive supplier of aquaculture equipment," is a Norwegian company. AKVA's strength lies in its ability to supply almost all necessary items in-house. Furthermore, they organize the aquaculture environment according to customer needs and provide employee training. Because they provide both education and support, aquaculture businesses can be established even in regions where the industry has not previously developed. I plan to proceed with this research by drawing comparisons with the AKVA Group, a professional collective in aquaculture.

3. Results and Discussion

3-1 Results

Introduction of Region-Specific Aquaculture Projects We will introduce aquaculture projects adapted to the local environments in regions of Africa and Asia where hunger is severe. This is expected to lead to a stable food supply and the creation of local jobs.

Technical Support via International Cooperation We will share Japan's successful aquaculture technology with other countries and cooperate with local engineers to build sustainable aquaculture systems. This will raise food self-sufficiency rates and contribute to the alleviation of hunger problems.

Provision of Education and Training

- We will provide education programs regarding aquaculture technology and management to support local people in developing the aquaculture industry themselves. This will enable the realization of long-term food security.

3-4. Nutritional Value of Pacific Saury

- Pacific saury contains high-quality protein with a balanced profile of essential amino acids, iron (useful for anemia prevention), Vitamin A (strengthens mucous membranes), Calcium and Vitamin D (supports tooth and bone health), and unsaturated fatty acids such as DHA and EPA. These nutrients will support the health of people suffering from hunger.

3-2 Discussion

Source(s):Technology transfer through networks: experiences from the Norwegian seafood industry. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

• Key Points I Learned:

1.Community Function: Creating a space (network) where producers learn from each other and share challenges.

2 Promoting Dialogue: Establishing a space where small-scale producers and researchers/scholars can engage in constructive dialogue is itself the first step toward innovation.

3 Conditions:The members of research must have the same level of skill and knowledge.

4 Conclusion:It is vital to have a network in which producers cooperate with researchers.

4. Conclusion and Future Prospects

The goal is to farm genome-edited Pacific saury to primarily eliminate hunger in Asian regions.

- **Elimination of Hunger + Elimination of Poverty** A drawback of this proposal is that while land-based aquaculture is suitable for Pacific saury, it requires facilities, human resources, and funding. The challenge for the future is how to secure these resources.

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World's First Successful Aquaculture of Pacific Saury

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Cutting-edge Aquaculture Technology in Norway —Present and Future— | Fisheries Promotion Web Edition | Tokyo Fisheries Promotion Foundation

- *Topic: AKVA Group*

Development sustainable cosmetic

~Be clean from daily life~

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Abstract

This study examines the environmental and health problems caused by microplastics used in cosmetics and explores the possibility of developing vegetable-based cosmetics as an alternative. Through a literature-based investigation of microplastics, existing vegetable-derived products, and cosmetic manufacturing systems, this research analyzes the feasibility of producing eyeshadows from discarded vegetables. The results suggest that vegetable-based cosmetics are technically feasible and environmentally beneficial, while challenges remain in manufacturing, branding, and global distribution. This study concludes that region-based product development and customizable cosmetics could contribute to reducing microplastics and promoting sustainable consumption.

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1. Introduction (Background, Significance, and Purpose)

Cosmetics are widely used in daily life, yet many products contain microplastics that pose risks to both the environment and human health. This study focuses on the development of cosmetics made from vegetables, particularly discarded vegetables, as a sustainable alternative. By examining existing research and industry practices, this paper aims to clarify what kinds of research and development are necessary to reduce microplastics in cosmetics and to promote environmentally friendly products worldwide.

1-1. Social Context (Current Situation and Problems)

According to a survey conducted by ASMARQ, 68.9% of women apply makeup four to six days a week, indicating that cosmetics play a significant role in everyday life. However, researchers such as Haruyuki Kanehira of Otsuma Women's University point out that primary microplastics used in cosmetics cannot be completely removed from the environment. These microplastics are found not only in scrubs but also in leave-on products such as eyeshadows and lipsticks, raising concerns about environmental pollution, skin absorption, and accidental ingestion. Therefore, reducing microplastics in cosmetics has become an urgent social issue.

1-2. Previous Research

Previous studies and practices have explored plant-based cosmetics, mainly focusing on skincare products such as lotions and soaps that utilize plant moisture or extracts. For example, students at Fukuyama Akenohoshi Girls' High School developed eyeshadow using powdered dried vegetables and jojoba oil as part of the MIRAIB. Project. While these studies demonstrate the feasibility of plant-based cosmetics, research on color cosmetics made from vegetables remains limited, leaving room for further exploration.

1-3. Research Question (RQ)

Most existing vegetable-based cosmetics are limited to skincare products, despite the widespread use of color cosmetics that often contain microplastics. This study therefore asks the following research question: *What kinds of research and development are necessary to eliminate microplastics produced by cosmetics within the next 30 years and to distribute truly "good" cosmetics worldwide?* This question is important because addressing microplastics in cosmetics could contribute to both environmental protection and human health.

1-4. Hypothesis

This study hypothesizes that cosmetics made from vegetables, including discarded vegetables, are technically feasible and environmentally beneficial. By drying and powdering vegetables and combining them with natural binders such as rice wax, it may be possible to create safe and functional eyeshadows. However, it is also hypothesized that commercialization will be challenging due to licensing requirements, manufacturing costs, branding difficulties, and differences in available plant resources across regions.

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2. Research Method

This research was conducted as a literature-based study. First, academic articles and reports on microplastics in cosmetics were reviewed to understand their environmental and health impacts. Second, case studies of vegetable-based and plant-derived cosmetics were analyzed to examine existing methods and limitations. Third, information on cosmetic manufacturing licenses, OEM production systems, and sustainable packaging practices was collected and compared. Finally, these findings were analyzed to evaluate the feasibility of vegetable-based eyeshadows and to assess how the hypothesis and research question could be addressed.

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3. Results and Discussion

3-1. Results

The literature review revealed that many cosmetic brands rely on OEM manufacturing, allowing products to be sold without holding manufacturing licenses directly. Existing plant-based cosmetics mainly focus on skincare, while examples of vegetable-based color cosmetics are rare. Research also showed that customizable and refillable cosmetic products are already accepted in the market, suggesting potential demand for customizable vegetable-based eyeshadows. Additionally, studies emphasize that sustainability-focused products can attract environmentally conscious consumers.

3-2. Discussion

These results indicate that the hypothesis is partially supported. From a technical perspective,

vegetable-based cosmetics are feasible, and existing manufacturing systems such as OEM production could enable market entry. However, challenges such as brand recognition, cost, and regional differences in plant availability remain significant. Comparing different studies suggests that a region-based approach—using locally available discarded vegetables—could address these challenges. Furthermore, customizable cosmetics could reduce waste and increase consumer engagement, offering an innovative solution from a sustainability perspective.

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4. Conclusion and Future Prospects

This study concludes that vegetable-based cosmetics have the potential to reduce microplastics and contribute to a more sustainable cosmetic industry. While technical feasibility has been demonstrated through previous studies and existing practices, successful implementation will require strategic manufacturing partnerships, effective branding, and region-specific product development. In the future, further research should focus on eco-friendly packaging materials, such as non-plastic containers, and on expanding the range of pigment-rich plants used in cosmetics. By continuing this research, both producers and consumers can play a role in promoting environmentally responsible cosmetics.

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Wage Increase for SMEs

and

Support for Developing Countries

～A Method to Solve Them Simultaneously～

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Abstruct

In this research, I considered how to solve two problems; lack of continuous support for developing countries and low wages for small and medium enterprises.

1,introduce

1-1 Social Context

Japan is home to a lot of companies. Among them, small and medium-sized enterprises (SMEs) account for 90% of the total, and support Japan's hierarchical subcontracting structure. However, a key issue within this structure is the difficulty in SMEs' raising wages. Employees at large corporations already receive higher base salaries and have the opportunity for annual spring wage negotiations, known as "Shunto." Yet, even though large corporations can earn higher salaries, this is not likely to be into wage increases for SMEs. Instead, rising prices mean SMEs constantly operate under severe pressure.

Additionally, a controversial issue is the challenge faced by developing countries. Temporary aid, such as monetary or food distribution, risks creating dependency among local populations, preventing them from living on their own. Not only temporary but also continuous support is essential.

1-2. Previous Research

◯Baeren brewery Co.,Ltd

Ordinally, the company didn't have overseas sectors and expertise to expand to foreign countries, so they utilized some organizations such as JETRO. As a result, they could succeed in expanding their sales channels.

◯Hanazen CO.,Ltd

Through serious on-site research, the company successfully expanded overseas with a low capital investment of 10,000 euros (approximately 1.3 million yen at the time). As in the above example, obtaining information from organizations like JETRO was instrumental in facilitating this expansion.

1-3. Research Question

"Can we solve the lack of continuous support for developing countries and low wages for

small and medium enterprises simultaneously?”

→ SMEs have a difficulty to increase profits under current Japan’s industrial structures. The problem lies in the fact that wage increases for workers have not kept pace with the recent rapid rise in prices. Furthermore, many countries still struggle with poverty, and even in regions like emerging countries that appear to be developed as well as developed countries, rural poverty remains a significant issue in many cases, requiring continuous support.

I will consider how to solve these two problems simultaneously.

1-4. Hypothesis

If SMEs can expand to developing countries and realize job creation and technological support there, we might solve two problems simultaneously.

2. Research Method

The first thing I should do is to search for successful examples of SME’s expansion in order to know why those companies could succeed. At the same time, I checked the details of loans or supports by the government or each institutions which may assist expansion.

Also, we have to gather significant information, such as differences of labor costs or growth rates between Japan and developing countries.

3. Results and Discussion

3-1 Results

I set the goal of this study as "supporting developing countries," but I learned that developing countries themselves involve various categories, such as "least developed countries (LDCs)" and "emerging countries." However, since LDCs present challenges for SMEs to enter, I focused my consideration on supporting the poor in emerging countries.

Emerging countries are developing countries with high growth potential. While market expansion is expected in recent years, the unemployment rate among the poor remains high.

3-2 Discussion

Considering the result of my research, what I want to propose is that SMEs expand into the regional areas of emerging countries. The regional areas of emerging countries have advantages such as good access to rapidly developing urban centers, low labor costs, and easier access to workers. Of course, whether SMEs can expand overseas remains a significant challenge. However, as demonstrated in former research, leveraging various information agencies or institutions make overseas expansion

possible even with limited finance.

Regarding the benefits for emerging economies, SMEs' expansion could create local employment and enable a steady supply of products to the high-consumption urban centers of these countries.

Once one company successfully expands overseas, it can become a catalyst for other SMEs to follow. Furthermore, if many companies manage to expand, governments concerned about declining domestic production capacity, might increase support for domestic enterprises.

4. Conclusion and Future Prospects

Considering the reasons I mentioned above, I suggest that SMEs expand to the regional areas of emerging countries. By outsourcing some parts of production to local people, SMEs can create jobs there and enter markets of emerging cities. SMEs should aim for a wage increase by doing so.

There are still some problems with my purpose; "Which institutions or aids should SMEs rely on?," "How should they solve financial problems?." I have to think about those problems.

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Solving Educational Problems through Stationery Around the World

～Connecting Developed Countries to Developing Countries～

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ID 5118 氏名立木秀梧

Abstract （研究の概要）

――――Today, many children in the world cannot get a good education. There are many reasons for this problem. Some children have no school near their home. Some countries do not have enough teachers. Some families cannot send their children to school.In this research, I focus on stationery, such as pencils and notebooks. I want to know if more stationery can help children study better and go to school. I used data from *The State of the World's Children* and *World Vision* to think about how to help education more efficiently.I have two ideas. One is the "Light Green Ribbon Campaign," which helps poor children get education through donations. Another is the "Green Feather Fund," which collects money and used stationery to give to children who need them. By doing these activities, I hope to make education better and raise the education level in the world.――――

1. Introduction (Background, Significance, and Purpose)

――――Educational disparity across nations has emerged as a global issue in recent years, particularly prevalent in developing countries in regions such as the Middle East, Asia, and Africa.One major consequence of this educational gap is the difference in academic achievement. Disparities in educational attainment are directly linked to an individual's economic prospects: those who have not received adequate schooling are less likely to secure stable, high-income employment in the future than those who have.This lack of stable income then makes it difficult for individuals to provide their own children with sufficient education, creating a vicious cycle of academic disparity.As this issue continues to be a worldwide problem, it has become essential to break this cycle.――――

1-1. Social Context (Current Situation and Problems)

――――The educational gap in the world is widening. Even in terms of literacy rates, there is a significant disparity between developed and developing countries. While some countries place great importance on addressing educational issues, many regions lack the money or resources to implement effective measures.――――

1-2. Previous Research

――――The primary factor contributing to the disparity in educational access and enrollment rates is poverty.Families lacking financial resources often cannot afford to send their children to school. Consequently, children are forced to work to earn income, losing the time and opportunity to receive an education. This cycle effectively denies children their fundamental right to education due to poverty.Regional factors also play a significant role, notably the differences in the number of educational facilities and qualified educators between regions. Furthermore, the existing information gap between developing and developed nations translates directly into an information gap among children.This educational disparity leads to critical consequences when children reach adulthood: they struggle to secure stable, well-paying jobs and lack access to essential knowledge and information required for daily life. Ultimately, this results in a vicious cycle that makes it extremely difficult for them to escape poverty.（world vision）

This document compiles and quantifies the levels of educational attainment and literacy rates across various nations worldwide.

A comparison of literacy rates between developed countries and developing nations in Africa highlights a significant gap, based on data spanning 2013 to 2022.
In developed countries, the results are very high: Portugal shows an exceptional literacy rate of 100% for both males and females, and Argentina is similarly high, with males at 99% and females at 100%.
Conversely, in developing African countries, the rates are much lower and show a marked gender disparity: Guinea has a male literacy rate of 70% compared to just 43% for females, and Mali reports males at 55% and females at 38%.
This comparison clearly demonstrates the profound difference in literacy rates between developed and developing nations.（The State of the World's Children）

In February 2022, J.POSH (Japan Pink Ribbon of Smile and Happiness), a certified NPO, celebrated its 20th anniversary. With the motto “Get screened for breast cancer — early detection leads to a life full of smiles,” the organization aims to “reduce the number of people who suffer from breast cancer, even by one.” Looking ahead to its 30th and 40th anniversaries, J.POSH continues to strengthen and expand its Pink Ribbon activities. Part of the proceeds from Pink Ribbon–related products is donated to support breast cancer treatment.（Certified Nonprofit Organization）————

1-3. Research Question (RQ)

————What are effective ways to use stationery to support the solution of global educational problems?————

1-4. Hypothesis

————We believe that providing stationery support to developing countries that have committed to addressing educational issues is an effective way to increase school enrollment and attendance rates.To sustainably raise a nation's educational standards, we recognize the necessity of simultaneously implementing improvements in the overall living environment.
Specifically, we propose that targeting countries with policies similar to those that led to success in raising educational standards in places like Scotland, or countries with clearly aligned goals, could significantly maximize the efficiency and impact of the aid provided.————

2. Research Method

————Using data from the State of the World’s Children Report, as shown in previous studies, I will explore how different countries address educational issues and identify common characteristics of nations where education levels remain low. Based on these insights, I aim to consider more effective ways to provide support and improve educational standards.————

3. Results and Discussion

3-1 Results（結果）

————I. Application of Pink Ribbon Activities

This proposal aims to apply the Pink Ribbon fundraising model—used in Japan to support breast cancer treatment—to improving global education enrollment rates. In the Pink Ribbon movement, a portion of the sales of designated products is donated to breast cancer treatment. As an adaptation of this approach, I propose the “Light Green Ribbon Campaign.”
In this campaign, part of the revenue from products labeled as Light Green Ribbon items would be donated to countries working to address educational challenges, thereby helping raise education enrollment and overall educational standards. In addition, stores cooperating with the Light Green Ribbon Campaign would display a sticker indicating their participation, gradually expanding the scale and visibility of the initiative.

II. Donating School Supplies to Developing Countries
I propose the “Green Feather Fund,” a support initiative in which developed countries provide school supplies to developing nations. This campaign is primarily aimed at assisting developing countries, and its activities involve collecting both monetary donations and usable school supplies within schools in developed countries. Through the Green Feather Fund, students donate stationery items they no longer use, along with financial contributions, which are then sent to developing countries. By doing so, the campaign seeks to help improve the quality of education and raise overall educational standards in these regions.

III. Establishing an International Organization for Solving Global Education Issues
I believe it is essential to establish an organization that oversees the activities proposed in Sections I and II and serves as a bridge between developed and developing countries. As an international organization focusing primarily on educational challenges, it would coordinate efforts, implement support programs, and promote collaboration across nations. Through these activities, the organization aims to improve the quality of education and raise educational standards worldwide. ————

3-2 Discussion（考察）

————Brazil serves as a successful model for implementing educational aid with strict planning and conditions. The country first assesses whether a location is appropriate and suitable for support before commencing aid.
Drawing on this precedent, we hypothesize that applying specific conditions to developing countries' educational support will lead to more efficient aid delivery. For example, imposing requirements such as setting minimum attendance rates could ensure that the assistance directly contributes to educational continuity and commitment from the recipients.
By adopting a structured, conditional approach, aid can be directed to environments where it is most likely to achieve lasting educational improvement.————

4. Conclusion and Future Prospects

————It is essential to identify developing nations that are actively addressing their educational issues and determine which countries would be the most effective starting points for

our proposed aid.To guide the improvement of educational quality and standards in developing nations, future research, commencing next year, will involve a detailed investigation into the policies of countries like Scotland, which successfully tackled educational challenges and raised【Solving Educational Problems through Stationery Around the World】 5118 Tatsuki-5

its educational standards in the past.A particular focus of this upcoming research will be placed on regions such as Africa. Given that the issue there is often not a shortage of teachers but rather the quality of instruction, our study will specifically integrate strategies for the enhancement of teacher quality and professional development.――――

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世界の教育格差ランキング【2023年最新版、202の国・地域の教育ランキング】| ソーシャルエッグ
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Introduce Japanese Food to Africa

～Development from Agriculture～

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Abstract

This research aims to extend average healthy life expectancy in developing countries by incorporating Japanese cuisine. The research method involves reviewing academic papers and other literature. The findings indicate that before introducing Japanese cuisine, agricultural production in developing countries must be increased through mass production. Furthermore, once mass production is achieved, mechanization will follow, enabling the provision of food at lower costs than imports, thereby facilitating the country's development.

1. Introduction (Background, Significance, and Purpose)

Globally, disparities in healthy life expectancy are widening. Among these, the gap in average healthy life expectancy between developing and developed countries continues to grow. Japanese cuisine is something we can proudly present to the world. It can extend healthy life expectancy, is highly nutritious, and makes it easier to live each day healthily. However, there are people around the world struggling just to survive each day, and we must save them as soon as possible.

1-1. Social Context (Current Situation and Problems)

The world is divided into developed and developing countries. People in developing countries struggle just to survive, let alone access food. Even those engaged in agriculture often face natural disasters or crop failures, making it difficult to secure regular meals. According to the World Health Organization (hereafter referred to as WHO) data released on June 8, 2024, the average healthy life expectancy worldwide shows Singapore ranked first at 73.4 years, while Lesotho had the shortest at 44.6 years—a gap of approximately 29 years. Furthermore, data released by the Organisation for Economic Co-operation and Development (hereafter referred to as OECD) revealed that among the top 50 countries with the longest average life expectancy, only 8 are developing nations.

1-2. Previous Research

First, research is needed to determine whether Japanese cuisine is suitable for extending healthy life expectancy. Therefore, I read the paper “Effects of Japanese Diet on Aging and Health Function” researched by Tsuzuki Takeshi. It stated that the 1975-style Japanese diet was the optimal diet. However, this Japanese diet used significantly more sugar and sweeteners, legumes, fruits, seaweed, seafood, eggs, seasonings, and spices compared to Japanese diets from other eras. Considering the dietary realities of developing countries, many of these ingredients are simply unavailable. In developing countries where basic food supplies are insufficient, we must consider how to establish a solid dietary foundation.

1-3. Research Question (RQ)

We will proceed with research using “How to extend average life expectancy through agriculture” as the research question. Agricultural production in developing countries is overwhelmingly lower than in developed nations. The current reality is that they have no choice but to rely on imports. However, importing itself costs money, leaving little for

investment in school education and other areas. Consequently, these countries cannot develop, their populations cannot live in stable environments for generations, average life expectancy does not increase, and children must work from a young age just to survive. If agricultural production could be increased, the vast majority of money would no longer be lost to imports. It could instead be allocated to education, enabling the country's development. Take Jamaica as an example. Jamaica's annual trade balance is -5.75 (in billions of US dollars). The country is overwhelmingly dependent on imports.

1-4. Hypothesis

First, to promote Japanese cuisine, we must create an environment where people can consistently access meals. However, agriculture in developing countries has fallen into a vicious cycle. As highlighted in Hirohiko Shinbo's research paper, “The Vicious Cycle of Absolute Poverty and the Agricultural Crisis in Developing Countries,” this cycle is also financially self-perpetuating. What kind of agriculture can achieve mass production at the lowest possible cost without over-reliance on imports?

2. Research Method

First, I needed to know the global average healthy life expectancy, so I searched for the world average life expectancy provided by the WHO. I also needed to distinguish between developed and developing countries, so I searched for the definitions of developing countries and developed countries established by the Japan WHO Association. Furthermore, to find a specific example, I selected Jamaica as a case study and searched for Jamaica's health indicators.

3. Results and Discussion

3-1 Results Discussion

The first step should be to increase grain production. Both Africa and the Near East have overwhelmingly low grain yields, showing a clear gap compared to the United States. Furthermore, it's not that they have nothing to export, but rather that they have nothing to spare for export. Consequently, they rely on imports to obtain food, creating a cycle that hinders development. Moving forward, it is necessary to establish production methods and enable mass production. Furthermore, once mass production is achievable, mechanization must be pursued to reduce the cost of each individual food item.

4. Conclusion and Future Prospects

Going forward, increasing production volume must be the top priority. If we can allocate funds toward domestic industries and education rather than spending heavily on imports, the nation will develop and healthy life expectancy will increase. However, even with increased production, labor costs will inevitably raise retail prices, making imported products overwhelmingly cheaper. Therefore, by pursuing mechanization to reduce labor costs, we can achieve mass production and sell at the lowest possible prices. Achieving such development would enable the spread of Japanese cuisine and contribute to global progress.

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Jules Pretty, Camilla Toulmin & Stella Williams　Sustainable intensification in African agriculture

To eliminate discrimination through sports

～How can we promote WMG?～

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Abstract
I believe sports have the power to connect people beyond race and religion. That's why I want to promote the WMG, a sports competition open to anyone over 35 years old.Therefore, I propose that the WMG and the Olympics be held in the same year. By doing so, we can promote the WMG alongside the Olympics, which I believe will increase the WMG's visibility.

1-1. Social Context (Current Situation and Problems)

Currently, racial discrimination is a problem in many regions, including Japan. Over 30% of foreign residents in Japan have experienced discrimination.

1-2. Previous Research

Many policies have been implemented to eliminate discrimination, yet discrimination still persists.

1-3. Research Question (RQ)

How can we eliminate discrimination through sports?

1-4. Hypothesis

By aligning the hosting years of the Olympics and the WMG, we can leverage the power of the Olympics to promote the event.

It will be possible to create posters and advertisements combining the Olympics and the WMG. Furthermore, by aligning the hosting years, the Olympic Truce—an international initiative calling for a global ceasefire during the Olympic and Paralympic Games (from seven days before the opening ceremony to seven days after the closing ceremony)—will ensure safe participation from around the world.

If the WMG gains popularity through such activities, demand for WMG television broadcasts will increase, making broadcasts feasible and further expanding its reach.

2. Research Method

Use the internet to research the reality of discrimination and the impact of sports.

3. Results and Discussion

3-1 Results

To secure broadcast rights, WMG must become popular enough to convince networks that airing it on television is worthwhile. However, holding WMG concurrently with the Olympics would allow simultaneous promotion of both events, which I believe would boost WMG's popularity.

3-2 Discussion

By promoting WMG, we hope that athletes will gain understanding beyond national and religious boundaries through competing and cooperating with one another, and that spectators will be inspired

by their efforts.

4. Conclusion and Future Prospects

To address the issue of discrimination, which is a problem worldwide, I want to carry out initiatives that harness the power of sports. To that end, I aim to promote the World Masters Games (WMG), a sporting event open to anyone aged 30 or older. To achieve this, I will conduct activities that leverage the influence of the Olympic Games, the world's largest sporting event.

The first strategy is aligning the event years. By synchronizing the years in which the Olympics and the WMG are held, this leads to our second strategy: promotional activities. We will create posters and advertisements that combine the Olympics and the WMG to make promotion easier.

The third point is television broadcasting. We have found that most people watch sports on TV. Therefore, until television broadcasting becomes possible, we will promote the WMG through the first two initiatives. Once television broadcasting is available, we plan to create commercials and use television to further promote the event.

Through these initiatives, we aim to spread the WMG throughout the world, including Japan. By having people of various cultures, religions, and nationalities participate and play sports together, we believe this will foster cross-cultural understanding and help resolve issues of discrimination.

This study does not consider hosting costs or the potential drawbacks of holding the Olympics in the same year as other major events. One potential drawback is that holding these events in the same year would result in multiple global sporting events taking place simultaneously, thereby reducing the annual variety of sporting events to look forward to.

Furthermore, regarding hosting costs, as the events become more widespread and larger in scale, the costs will inevitably increase. Therefore, moving forward, we intend to examine who will bear these costs and how, as well as identify the drawbacks of the three activities mentioned here and explore ways to address them.

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How to solve obesity in the world?

~Solution in the developing and emerging countries~

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Abstract

Mexico faces a critical public health crisis characterized by the "double burden of malnutrition," where rising obesity rates coexist with persistent undernutrition. While Mexico has been a global pioneer in implementing fiscal measures like the Soda Tax and the "Octagon" warning label system (NOM-051), these interventions face significant structural hurdles. This paper argues that while taxes on ultra-processed foods are necessary, their regressive nature places an unfair financial strain on low-income populations. To resolve this, the study proposes a "Circular Fiscal Model" where tax revenues are strictly earmarked for universal free school meal programs. This approach addresses the lack of transparency in current tax allocation and mitigates the influence of industrial lobbying.

1. Introduction

Obesity is no longer a localized issue of developed nations; it has become a defining challenge for the Global South. Mexico represents a unique case study where rapid urbanization and the influx of ultra-processed foods have led to a "double burden." This phenomenon is particularly devastating because the same households may suffer from both micronutrient deficiencies and caloric excess. Mexico's high consumption of Sugar-Sweetened Beverages (SSB) and "junk food" is not merely a matter of personal choice but a result of a broken food environment where unhealthy calories are the most affordable and accessible.

1-1. Social Context

Mexico is one of the world's largest consumers of SSBs and ultra-processed junk food. In 2014, the government enacted the "Soda Tax" and a tax on non-essential energy-dense foods (Junk Food Tax). Furthermore, in 2020, Mexico introduced the **"Octagons" (NOM-051)**—front-of-pack black warning labels indicating excess calories, sugars, or sodium. However, these taxes are "regressive," meaning low-income people suffer a greater financial burden. While the purchase of taxed drinks decreased by about 7.6%, obesity rates continue to rise. This suggests that the current system lacks a mechanism to return tax benefits directly to the vulnerable populations most affected by these price increases.

1-2. Previous Research

Current literature focuses on the "The influence of the sugar-sweetened beverage industry on public policies in Mexico." Studies show that while the Soda Tax reduced consumption, its revenue—originally intended for water fountains in schools—has often been absorbed into the general national budget. This **"Fiscal Opacity"** and intense lobbying from the food industry have slowed the progress of public health initiatives.

1-3. Research Question

RQ: Which combination of policy interventions, cultural preservation, and public health strategies is most effective in addressing Mexico's obesity epidemic?

According to the previous research, Mexico has made many measures until now. However, obesity still remains a major problem in Mexico. Therefore, I strongly believe that it is important for us to combine these strategies. It is expected to have a large effect.

1-4. Hypothesis

A comprehensive approach is required: fiscal policies (Junk Food Tax) must be combined with **"Circular Fiscal Reinvestment,"** where tax revenues are legally earmarked for **universal free school meal programs**. This strategy will mitigate the regressive nature of the tax, bypass corporate resistance by building public support, and directly address the "Double Burden of Malnutrition" by replacing junk food with nutritious school meals.

【How to solve obesity in the world?】 5121 Hachisu-3

2. Research Method

I conducted a literature review of recent studies regarding Mexico's IEPS (excise tax) and the impact of the NOM-051 labeling system. I also analyzed government reports concerning

tax allocation and the challenges of infrastructure development (water fountains and school facilities) in marginalized regions.

3. Results and Discussion

3-1 Results

1 Consumption Change: Taxes and Octagons successfully nudged consumers away from some processed goods, but substitution with other untaxed high-calorie foods remains a problem.

2 Transparency Issues: Much of the tax revenue remains in the general budget, and the promised installation of water purifiers in schools is lagging in many areas.

3 Industry Resistance: Corporations exert significant pressure to prevent the expansion of these taxes.

The literature review revealed several key findings. First, multiple studies reported that the soda tax in Mexico led to a measurable decrease in the purchase of sugar-sweetened beverages, particularly among low-income households. Second, however, national obesity rates continued to rise, indicating that reduced beverage consumption alone was insufficient to reverse the trend. Third, research emphasized that urbanization, increased availability of ultra-processed foods, and changes in traditional diets contributed significantly to obesity. Finally, community-based health education programs showed positive effects on dietary awareness, although their reach remained limited.

3-2 Discussion

These results suggest that obesity is not just a health issue but a **governance issue**. The tax is currently perceived as a "penalty on the poor" because the revenue is not visibly helping them. By reinvesting this money into free school meals, the government can solve three problems at once: (1) reducing the financial burden on the poor, (2) improving child nutrition, and (3) creating a transparent system that the public will support, making it harder for corporations to lobby against it.

4. Conclusion and Future Prospects

In conclusion, a "Single Policy" like a tax or a label is insufficient. Mexico must bridge the gap between tax collection and public benefit. The most effective strategy is a multi-layered approach that includes strict labeling (Octagons) and a transparent reinvestment of "Junk Food Tax" into "School Meal Funds." In the future, researchers should monitor the long-term health outcomes of children who receive these meals. As a society, we must ensure that health policies promote equity rather than increasing the burden on the impoverished.

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A Support Model for Developing Regions Using Food Loss Business

～Aiming for Solutions Tailored to Poverty Levels～

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Abstract
This study examines a sustainable support system utilizing a business model based on food loss to address the globally worsening problem of chronic hunger. Specifically, it proposes the international trade fair format “Tradition Dishes Trade Show (TDTS)” and devises a mechanism directly connecting producers in developing regions with consumers in developed countries. While existing food banks and donation-based support lack sustainability, TDTS is characterized by partially incorporating market principles, promoting economic participation rather than aid dependency. The research mapped the distribution and causes of hunger, clearly identifying the logistics, hygiene standards, and institutional support required for implementation. It concluded that while TDTS can simultaneously reduce food loss and address nutritional deficiencies, sustainable operation necessitates a tripartite collaboration between national governments, international organizations, and private enterprises.

1. Introduction (Background, Significance, and Purpose)

Hunger is spreading across various regions worldwide. According to UNICEF's 2023 Food Security Report, the number of hungry people globally has reached 821.6 million. While some improvements have been seen in specific areas like stunting and exclusive breastfeeding, global hunger levels have remained high for three consecutive years. A deeply concerning number of people continue to face food insecurity and malnutrition.

Among these regions, Africa faces the most severe situation, while Asia has the largest number of people suffering from hunger. Africa has the highest prevalence rate of hunger globally, with 256.1 million people affected, a number that continues to rise. In areas experiencing hunger and food shortages, prevalence rates are trending upward; in East Africa specifically, 30.8% of the population suffers from undernourishment. Furthermore, in Asia, the number of people suffering from hunger is estimated to be over 513.9 million. Urgent action is needed, especially for those living in South Asian countries.

1-1. Social Context (Current Situation and Problems)

1-1 Social Context

According to a 2023 UNICEF report, the number of people facing hunger worldwide has reached 821.6 million, with severe undernourishment concentrated particularly in Africa and South Asia. In Africa, 30.8% of the population faces chronic hunger, while over 500 million people in South Asia suffer from undernourishment. Meanwhile, globally, approximately 1.3 billion tons of food are wasted annually (FAO, 2021), making the integration of food loss reduction and nutritional support an international challenge.

1-2 Review of Previous Research

Food bank activities (such as Second Harvest) have achieved some success domestically

and internationally, but many rely on donations, posing sustainability challenges. Additionally, business matchmaking exhibitions like the SMTS (Supermarket Trade Show) have successfully expanded distribution channels for the food industry. An integrated international mechanism that simultaneously utilizes food loss and supports developing regions has yet to be established.

1-3 Research Purpose and Research Question

The purpose of this study is to achieve sustainable support for developing regions through business models based on food loss.

The research question is as follows:

1-3. Research Question (RQ)

RQ: What is the optimal system design for supporting developing regions using food loss business models?

1-4. Hypothesis

By establishing a venue (Tradition Dishes Trade Show, hereinafter TDTS) where buyers from various countries can gather and interact, primarily in target regions, we believe this will not only assist developing regions in entering markets but also contribute to solving the global food loss problem.

Furthermore, for regions within the country experiencing severe economic disparities, domestic food sharing is considered an effective approach.

2. Research Method

Data Collection

Using tools such as the FAO Hunger Map, identify regions with over 15% undernourished populations and analyze causes of hunger, agricultural characteristics, and distribution environments.

Case Analysis

Compare existing food banks, SMTS, and international aid programs to identify strengths and challenges.

Model Design

Based on collected data, design the TDTS operational process (participating entities, logistics routes, transaction formats, contract management).

Implementation Feasibility Assessment

Examine cost structures, logistics challenges, and cultural barriers to present implementation conditions.

3. Results and Discussion

3-1 Results

Overview of the TDTS Model

Basic Design

As an “international business negotiation exhibition,” TDTS features the following:

Target Participants: Farmers and cooperatives from developing regions, buyers from developed countries, NGOs, government agencies

Transaction Content: Reprocessed surplus food products, local specialty goods, technical cooperation and infrastructure support

Negotiation Format: Exhibition → Presentation → Negotiation → Contract Disclosure → Follow-up

Logistics Design

Transactions focus on processed goods (dried, canned, ambient-temperature foods) suitable for long-distance transport.

Developed-country companies provide technical support to regions lacking cold chains.

Post-contract delivery routes are secured using international logistics firms and the UN World Food Programme (WFP).

Economic Model

Trade-based: Export developing country products to developed country markets.

Exchange-based: Exchange food for agricultural infrastructure and technology.

Donation-based supplementation: International agencies provide emergency support for acute hunger.

3-2 Discussion

Advantages

Simultaneously reduces food loss and combats hunger.

"Self-sustaining support" through trade, not donations.

Opportunities for buyers: low-cost procurement and new market development.

Challenges

Imbalance among participants (developed countries tend to dominate).

Differences in hygiene and safety standards.

Political risks (difficulty fulfilling contracts in conflict zones).

Negotiation costs due to language and cultural barriers.

Implementation Conditions

International organizations (FAO, WFP) mediate logistics and standard coordination.

NGOs serve as local coordinators.

Simplify food safety standards through intergovernmental agreements.

Incorporate an ICT platform to enable online negotiations.

4. Conclusion and Future Prospects

This study proposes the "TDTS" international exhibition format, based on food loss business, as a solution to chronic hunger in developing regions. It demonstrates its potential as a "market-based support" alternative to donation-based aid and identifies logistical, institutional, and cultural challenges. Moving forward, it is necessary to verify the feasibility of pilot projects in actual case regions (e.g., Kenya, Bangladesh) and to estimate the quantitative extent to which this approach can contribute to reducing the number of people suffering from hunger.

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Toward Improving the World's Drought Problems

~Achieving Efficient and Sustainable Desalination~

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Abstract
This study focuses on droughts caused by current global warming and aims to improve the efficiency and sustainability of desalination plants. The research method involves examining water shortages in different regions around the world, investigating various desalination technologies, and summarizing the advantages and disadvantages of each. Based on this analysis, the study considers which technology has the highest potential for widespread adoption. At this stage, the proposed conclusion is to promote the use of thermal diffusion–based desalination plants.

1-1. Social Context (Current Situation and Problems)

Today, various environmental issues around the world are becoming increasingly severe, and one of the most prominent among them is global warming. Even in Japan, the impact of global warming has grown significantly in recent years. Every summer, record-high temperatures are observed, and extreme weather events occur one after another. Reports of poor harvests caused by these climate abnormalities have also become a common sight in the news.

According to data from the Japan Meteorological Agency tracking global temperature trends, the average global temperature has risen by 0.76°C over the past 100 years. This figure is based on the long-term average, but if we focus only on the 2000s, the rate of increase is far more striking. In fact, last year marked the highest rise in average global temperature within the past century, with a year-to-year increase of +0.54°C.

Global warming has triggered numerous environmental problems, and the drought issue I intend to address in this study is one such example. A drought, simply put, refers to a situation in which rainfall does not occur over a long period of time, leading to water shortages. The “drought problem” encompasses the various social and environmental impacts caused by this prolonged lack of water.

Japan has long had abundant water resources, and while drought is considered a critical issue in many parts of the world, it has not attracted the same level of concern domestically. However, in recent years, it feels as though the threat of drought is gradually reaching Japan as well. One example can be seen in the everyday news about rising prices. These price hikes are partly influenced by drought.

A clear case of direct impact on Japan's agriculture is rice. Rice has long been considered a “model product” for price stability, consistently affordable and regularly seen on the dinner table. However, due to drought-related effects, rice prices continue to rise. There are also indirect impacts. Countries and regions where drought is more severe than in Japan include Africa, South Asia, and parts of Europe. When drought becomes more serious in these regions, it inevitably affects our own lives. Japan relies heavily on imports for many

agricultural products. If exporting countries suffer reduced crop yields due to drought, the cost of imports rises, forcing Japan to increase domestic prices accordingly.

Therefore, addressing the drought problem is not only a measure that can save people around the world from hardship caused by poor harvests—it is also an effective way to ease the rising cost of living in Japan.

As mentioned earlier, many countries and regions face drought-related challenges. Among them, I would like to focus on Europe. One reason is simply personal interest. Although Europe is geographically small, it contains many highly developed nations with diverse cultural and technological characteristics. Each country also possesses advanced technological capabilities, which is another notable point. Furthermore, Europe's high technological standards may allow it to provide solutions to drought-stricken developing regions. Since drought has a particularly severe impact on developing countries, cooperation from Europe—by sharing or transferring advanced technologies—could help these countries strengthen their technological capacities as well. This is another reason why I chose Europe as the focus.

Currently, research on desalination technologies is progressing in many countries, including those in Europe. Japan, too, has numerous companies and institutions conducting similar research. "Desalination" is not a single method; rather, it involves multiple approaches, each with its own advantages and disadvantages. Through this study, I aim to determine which desalination method holds the greatest practical value in today's world.

1-2. Previous Research

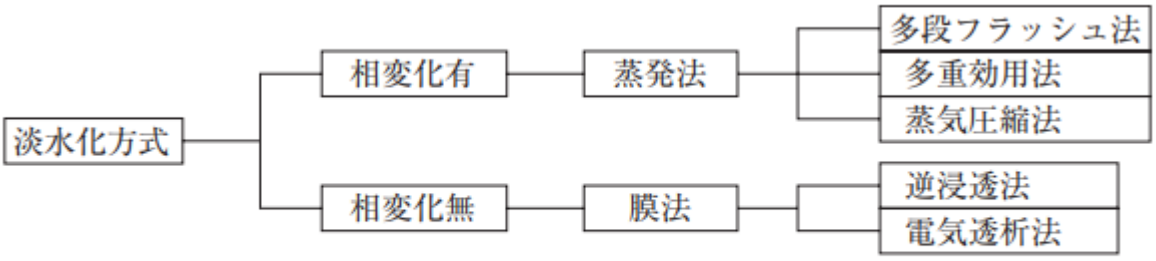


図 2－1　海水淡水化の諸方式

（出典：Science Portal China）

(1) Evaporation Methods

First, regarding the Multi-Stage Flash distillation method (hereafter, MFK). MFK is a method in which seawater is heated and suddenly evaporated ("flashed"), then cooled again to obtain fresh water. In other words, it is a desalination technique based on distillation. In practical

plants, multiple chambers with progressively lower pressure are combined to carry out desalination. This method has advantages such as being applicable to various types of feedwater and producing high-quality freshwater. However, it also has the drawback of requiring large amounts of fossil fuel for heating, which accelerates global warming and raises environmental concerns.

Next is the Multi-Effect Distillation method (MED). Although MED is fundamentally similar to MFK, the key difference is that the evaporated water is repeatedly sent to chambers with lower temperatures and lower boiling points as the process progresses. The advantages and disadvantages are similar to those of MFK, but MED consumes less energy compared to MFK.

The third evaporation-based technique is the Mechanical Vapor Compression method (MVC). In this method, steam generated in the evaporator is compressed to increase its temperature and pressure, and that high-temperature steam is then used again as a heat source in the evaporator to continue desalination. While MVC has lower desalination capacity than the other evaporation methods, it is well-suited for small-scale operations.

(2) Membrane Methods

Next are the two membrane-based methods.

First is Reverse Osmosis (RO). This method uses the natural tendency of liquid to move from low concentration to high concentration. In RO, pressure is applied to the high-concentration side so that water moves to the low-concentration side. During this process, the water is forced through a special membrane that allows water to pass but blocks dissolved salts, producing fresh water. RO consumes less energy than evaporation methods; however, if the feedwater is highly polluted, pretreatment is required, which can raise processing costs.

The second method is Electrodialysis (ED). In this method, two types of ion-selective membranes—those that allow charged components to pass and those that block them—are alternated. When an electric potential is applied across chambers containing seawater, dissolved ions such as salt are separated into concentrated and diluted compartments. Fresh water can then be obtained from the dilute compartment. Like RO, ED also requires pretreatment when the feedwater is highly polluted.

All five desalination methods mentioned above have their own advantages and disadvantages, but they share one major drawback: their significant environmental impact.

In evaporation methods, energy consumption is extremely high, resulting in heavy use of fossil fuels, depletion of limited resources, and the release of CO_2 and other substances that accelerate global warming.

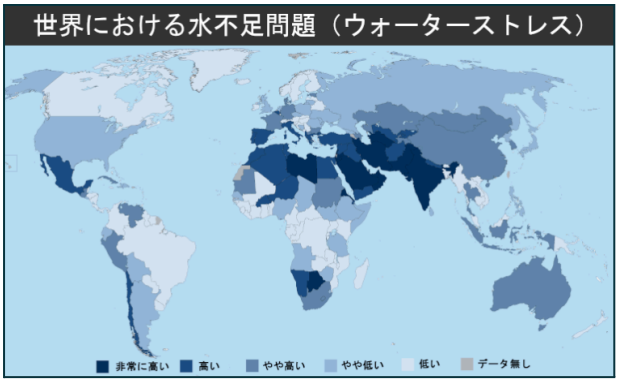
In membrane methods, after removing salt, the remaining liquid becomes even more concentrated. Currently, this concentrated brine is discharged directly into the ocean, increasing seawater salinity. This change in the marine environment reduces habitats and food sources for marine organisms, potentially causing species extinction and the collapse of ecosystems.

I believe that solving these environmental issues is essential for the future of our world. Economic challenges such as high construction and maintenance costs also remain. Nevertheless, the future potential of desalination is great, and new technologies beyond the five methods described here are already emerging. Through this preliminary research, I have come to recognize once again the possibilities of desalination. Advancing new technologies for desalination is indispensable for our future.

1-3. Research Question (RQ)

In this study, the research question is: **“What is required to achieve an efficient and sustainable desalination plant?”**

Like the sub-theme, it focuses on realizing desalination technology that is both efficient and sustainable. Throughout this research, I have examined what is necessary to achieve such a system.



As described in section 1-1 on social trends, water scarcity is becoming increasingly severe around the world. The figure on the left, based on WHO records, shows the global distribution of water scarcity by region. The darker the blue, the more serious the water scarcity. In some cases, the worsening water shortage has even led to conflicts over water resources, meaning that solving water scarcity can be considered one approach to reducing conflicts among nations.

However, as the figure indicates, the most severe water shortages occur in regions such as South Asia and North Africa. These areas often have high poverty rates and lack infrastructure such as water purification facilities and pipelines. As a result, many of these regions may be forced to give up the idea of constructing desalination plants due to financial constraints. For such regions, installing desalination plants—which require significant operational and maintenance costs—is difficult.

Therefore, it is necessary to identify desalination technologies that offer high energy efficiency and reduced energy costs, or those that are easier to manage and maintain at lower cost, or ideally, technologies that achieve both. Additionally, desalination plants have several drawbacks. A major example, mentioned earlier in section 1-2, is the issue of discharging concentrated brine directly into the ocean during the desalination process. For this reason, measures such as brine treatment are essential, and future desalination plants must be sustainable from an environmental perspective.

Considering these points, I believe that achieving desalination plants that are both efficient and sustainable would be highly meaningful for regions currently facing water scarcity—and ultimately, for the entire world.

1-4. Hypothesis

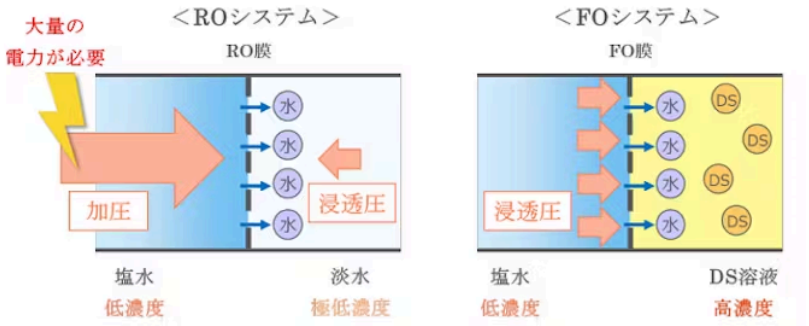


図 1　RO システムと FO システムの比較

This study proposes three main hypotheses.

The first is the introduction of Forward Osmosis (FO). The figure on the left compares FO with Reverse Osmosis (RO). As its name suggests, FO operates in the opposite direction of RO: it follows the natural movement of liquid from low concentration to high concentration, and desalination is achieved by passing the liquid through a membrane that blocks salts. Unlike RO, FO does not require applied pressure because it utilizes the natural osmotic flow of water. As a result, FO consumes less energy than RO.

However, FO also has drawbacks, particularly its low energy efficiency. Energy efficiency refers to how effectively energy is converted into useful work; the higher the efficiency, the lower the energy consumption. Compared to RO, FO has lower energy efficiency, and data show that, relatively speaking, FO can actually consume more total energy than RO.

This leads to my second hypothesis. Membrane-based desalination relies on the movement of water between solutions of different concentrations, which generates osmotic pressure. This osmotic pressure can be used to produce electricity, a technology known as an “osmotic power battery” or “desalination battery.” I propose that by integrating such a battery into a desalination plant that uses FO, it may be possible to operate the plant without relying on power generation methods—such as thermal power—that emit carbon dioxide, even if the total energy consumption increases.

Finally, the third hypothesis is the construction of a desalination plant equipped with a brine-treatment facility. As mentioned earlier, desalination has significant environmental impacts. Therefore, it is necessary to implement measures not only for energy-related environmental issues but also for the concentrated brine produced during desalination. By introducing a facility capable of processing and treating brine, the environmental burden could be reduced.

If these three hypotheses are supported, it would indicate the possibility of achieving desalination plants that are both efficient and sustainable.

2. Research Method

First, I will examine trends in maximum and average temperatures in various countries to understand the extent of global warming. I will also research current drought issues and desalination technologies around the world, focusing primarily on academic papers. Based on this, I will summarize the adoption levels, energy efficiency, costs, environmental impacts, and the advantages and disadvantages of each desalination method, thereby identifying the challenges that must be addressed.

Next, I will investigate the latest desalination technologies used in different countries, examine the mechanisms that enable them to surpass conventional methods, and clarify the differences between new and traditional technologies. After completing these steps, I will consider which desalination method is most suitable in terms of the research question—specifically, whether it is “efficient” and “sustainable”—and determine what is necessary to solve the identified challenges.

Additionally, I will explore potential solutions from different perspectives, particularly regarding cost and environmental impact. Based on all of these analyses, I will make my final proposal.

3. Results and Discussion

3-1 Results

As mentioned earlier, many regions and countries around the world are currently suffering from drought caused by global warming. Some of these regions are also unable to introduce desalination plants due to economic limitations. In addition, many conventional desalination methods consume large amounts of energy and emit significant amounts of carbon dioxide. Nevertheless, the world is unlikely to escape its dependence on desalination technologies. Even if the issue of cost could be addressed, expanding conventional desalination methods to a wide range of regions would not be realistic when considering their environmental impact.

In other words, solving the global drought problem requires the development of new desalination technologies. As explained in section 1-4 on hypotheses, I initially considered the introduction of Forward Osmosis (FO) as a promising new method. However, I also discussed its disadvantages, and ultimately, Reverse Osmosis (RO) proved to be more effective than FO. Therefore, it is necessary to explore desalination methods other than FO.

3-2 Discussion

In my considerations, I focused on whether desalination could be made sustainable by using renewable energy. This led me to a method known as thermal diffusion desalination. This technique utilizes thermal diffusion—the natural movement of salt from higher-temperature regions to lower-temperature regions using heat from the sun. In this process, seawater is placed between a plate heated to over 60°C and another cooled to below 20°C. As a result, water with low salinity can be obtained near the heated upper plate, while water with high

salinity can be collected near the cooled lower plate. Both temperatures required for the plates can be obtained from the natural environment, meaning desalination is possible even without nearby power facilities. This suggests that the method is relatively easy to introduce in developing countries.

From another perspective, one possible solution to the problems associated with desalination is to convert concentrated brine into sodium hydroxide and hydrochloric acid. This can be achieved through electrochemical synthesis using concentrated brine, hydrogen, and hydroxide ions. Sodium hydroxide can help adjust the pH of seawater before desalination, bringing it closer to neutral and reducing fouling within the desalination plant. It can also be used for cleaning the plant. In addition, it is useful for producing synthetic fibers and paper pulp.

Hydrochloric acid, similarly, can be used for cleaning desalination facilities. It also has applications in the production of chemicals, pharmaceuticals, pesticides, food additives, and cosmetics. Thus, both sodium hydroxide and hydrochloric acid have high utility. Converting concentrated brine into such chemical substances not only prevents the environmental damage caused by discharging high-salinity wastewater into the ocean, but also creates profit opportunities by supplying these chemicals to medical institutions, research facilities, and various industries.

4. Conclusion and Future Prospects

In conclusion, I would like to present two proposals.

The first is the introduction of desalination through thermal diffusion. As explained in the consideration section, this method directly utilizes solar heat to drive the desalination process. Because it requires no large external energy input, it eliminates concerns about both the cost of power generation and its environmental impact. The greatest advantage of this method is that it can be easily implemented in developing countries. As previously discussed, the energy cost is minimal, and the system relies on relatively simple technology. Its simplicity also makes repairs easier, reducing the need for specialized technicians. Furthermore, because the facility size can be adjusted flexibly, site restrictions become less of a concern, making installation more feasible in regions with limited infrastructure. Its low environmental impact further strengthens the case for its adoption.

Conventional RO technology suffers from the major drawback of requiring significant energy, which contributes to environmental problems associated with power generation. In contrast, thermal diffusion desalination can operate using only solar heat and requires far less energy overall. Widespread use of thermal diffusion desalination could even help mitigate global warming—the underlying cause of water scarcity addressed in this study. Additionally, membrane-based methods such as RO, FO, and ED require pretreatment of seawater to prevent equipment degradation. The thermal diffusion method does not require such pretreatment, making it even more advantageous. For these reasons, I consider thermal diffusion desalination to be both efficient and sustainable.

However, one significant challenge remains: the treatment of discharged brine, a common issue in many desalination methods. This leads to my second proposal: the decomposition and utilization of concentrated brine. As discussed earlier, electrochemical synthesis using concentrated brine, hydrogen, and hydroxide ions can produce sodium hydroxide and hydrochloric acid. Sodium hydroxide can be used for cleaning desalination plants as well as for manufacturing synthetic fibers and paper pulp. Hydrochloric acid also has numerous applications, including in chemical production, pharmaceuticals, pesticides, food additives, and cosmetics. Both substances are highly versatile.

Decomposing concentrated brine can greatly reduce the environmental impact of desalination and enhance its sustainability. Moreover, selling the recovered chemical products to medical institutions, research facilities, and various industries could generate revenue to support desalination plant operations and further research, contributing to the future development of desalination technologies.

For these reasons, I believe that the widespread adoption of thermal diffusion desalination and technologies for the decomposition of concentrated brine is essential for addressing global water scarcity and drought. The development of these technologies will be crucial for the future of the world.

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Making the Rich Aware of Poverty in India
～Through Interactive Media～

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5124. Shiho Horiguchi

Abstract
While severe poverty remains a global issue, wealthy individuals often find it difficult to recognize the relationship between their own actions and poverty. In response to this challenge, this study focuses on the potential of interactive films as a new approach to raising awareness. India was selected as the setting due to its significant domestic economic inequality and its well-established visual media culture, and previous studies were analyzed to theoretically examine how interactive films influence empathy, immersion, and a sense of personal responsibility. The review of prior research suggests that interactive films can transform viewers from passive audiences into active decision-makers, promoting shifts in perception of social issues through enhanced empathy and perspective-taking. Although interactive films have the potential to encourage wealthy audiences to reconsider poverty as an issue connected to their own choices, further work is needed to design narratives and decision structures that incorporate moral dilemmas and trade-offs effectively.

1. Introduction (Background, Significance, and Purpose)

It is reported that approximately 767 million people worldwide—about one in ten of the global population—are currently living in “extreme poverty,” defined as surviving on less than USD 1.9 per day. Under conditions of extreme poverty, it becomes difficult to cover even basic living expenses, and the inability to secure sufficient food leads to serious problems such as hunger and reduced life expectancy. Moreover, these issues do not end within a single generation; rather, through factors such as limited access to education, they are transmitted to the next generation, forming a persistent cycle of poverty.

Given this situation, it is unrealistic to expect that poverty-related problems can be resolved solely through the efforts of those living in poverty themselves. Therefore, the interest and active involvement of wealthy individuals are indispensable. However, despite the recognition of this necessity, it is not easy for the wealthy to become aware of how their own actions and consumption patterns affect people living in poverty. Although they are in a position to exert influence, the difficulty of recognizing their own “stakeholder status” tends to render the structure of inequality invisible, thereby delaying social improvement.

To overcome such lack of awareness, new mechanisms are required that enable wealthy individuals to recognize their own influence and encourage proactive engagement with social issues.

1-1. Social Context (Current Situation and Problems)

This study focuses on media works—specifically films and animations—as a potential means to achieve this goal. Media works have the capacity to influence viewers’ emotions and

cognition, thereby fostering awareness of social issues.Furthermore, to effectively raise awareness through media works, the choice of setting is of critical importance. Selecting an environment in which the existence of inequality can be intuitively understood by audiences is essential for enhancing the impact of the awareness generated through the work. Based on this perspective, this study establishes the following two criteria for selecting a setting: (1) the presence of significant domestic economic inequality that allows the issue to be easily visualized, and (2) the existence of sufficient digital devices and communication infrastructure to enable media works to circulate among wealthy populations.

After comprehensively examining these criteria, this study proposes India as the setting for the media work. India simultaneously exhibits pronounced domestic economic disparities and widespread use of information devices among the wealthy, particularly in urban areas, making it an effective setting for visualizing poverty-related issues and promoting shifts in awareness through media expression.

1-2. Previous Research

In recent years, India has experienced economic growth while also being characterized by extremely wide disparities between rich and poor. For example, national statistics report that more than 170 million people in India remain in a state of extreme poverty, living on less than USD 1.9 per day, indicating that poverty continues to be a significant issue. In addition, it is estimated that 85% of the country's wealth is concentrated among the top 10% of the population, clearly illustrating the structural nature of economic inequality.

Moreover, poverty in India is increasingly recognized as multidimensional in nature, which constitutes an important analytical perspective. According to reports by the National Institution for Transforming India (NITI Aayog), the multidimensional poverty rate declined from approximately 29.2% in fiscal year 2013 to about 11.3% in fiscal year 2022. Nevertheless, poverty involving multiple deprivations—such as in health, education, and living standards—continues to persist.

From a social-structural perspective, research has shown that social categories such as caste and tribal affiliation are strongly associated with poverty. Surveys analyzing poverty by caste indicate that traditional lower castes and tribal groups exhibit higher poverty rates than the general population. In 2004, these groups accounted for approximately 80% of the rural poor, demonstrating that poverty is heavily concentrated in rural areas and that rural poverty is particularly severe. At the same time, increasing migration from rural to urban areas in recent years has made urban poverty issues more visible, including the expansion of slums and the deterioration of living conditions in cities.

In addition, urban areas in India contain slum regions where poverty is manifested in particularly stark forms. Among these, Dharavi in Mumbai is internationally recognized as a representative example of urban slums characterized by extreme population density, lack of

basic services, and poor housing conditions. Such slums have become symbolic representations of domestic inequality.

India is also a country in which film culture is deeply rooted, and it is known for having one of the world's largest film industries, commonly referred to as Bollywood. This cultural background suggests the potential for visual media to make social problems visible and raise public awareness. Representative works that address urban slums and poverty have gained international attention, playing a role in making audiences aware of structural inequalities by depicting issues related to poverty and caste.

From the above analysis, India can be regarded as a highly suitable setting for media works, as it exhibits pronounced domestic economic inequality, the presence of multidimensional poverty and social discrimination, and a cultural foundation that enables the visualization of social issues through film.

1-3. Research Question (RQ)

"What kind of expression would be effective in helping India's wealthy recognize the impact their actions have on the poor through film?"

1-4. Hypothesis

By utilizing interactive films that involve audience participation, we believed affluent individuals could come to perceive poverty issues as something that directly concerns them.

2. Research Method

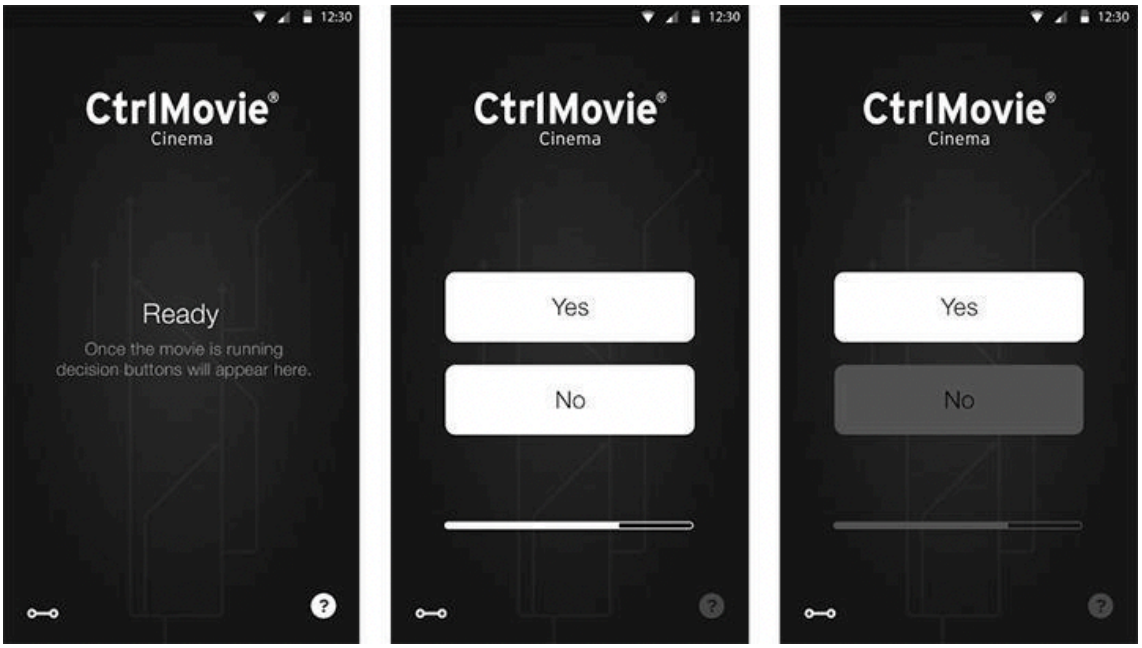
In conducting this study, English-language academic papers on interactive films and interactive fiction were reviewed, and their findings were compared and examined. Specifically, the analysis focused on studies investigating the effects of interactivity on viewers' empathy, immersion, and attitudinal change, as well as research that attempted to reduce social prejudice through perspective-taking. By comparing these prior studies, this research organizes how interactive narrative experiences can influence people's perceptions and behavioral intentions, thereby clarifying the positioning and originality of the present study.

3. Results and Discussion

3-1 Results（結果）

In recent years, interactive films have attracted attention as a new media format that expands the experience of film viewing. Interactive films differ from traditional films in that viewers

do not merely watch passively; instead, their choices influence the progression and outcome of the story. Specifically, at various points in the film, multiple options are displayed on the screen, and viewers vote on these options via a smartphone application, causing the narrative to branch accordingly. Because the storyline is determined based on the aggregated choices of individual viewers, each screening can result in different developments or endings.



（Ctrl Movie App Voting Screen）

One representative example of this format is a system that uses the smartphone application “Ctrl Movie.” In this system, audiences download the application in the movie theater and participate in voting at each branching point during the screening, thereby influencing the direction of the narrative. Globally, three films have already been screened using this system, and interactive films employing this technology have also been shown in Japan. In some cases, audiences can participate in voting up to five times during a screening, with as many as 48 possible narrative patterns and seven different endings, enabling a highly participatory viewing experience.

Interactive films are characterized by transforming viewers from passive recipients into co-creators of the narrative. Whereas conventional films involve one-way information transmission, interactive films reflect viewers’ decisions, allowing audiences to experience a sense of responsibility for the outcome of the story. This system positions interactive films as participatory media that go beyond mere entertainment and encourage deeper engagement and reflection.

Research on the effects of interactive films has focused on changes in viewers’ emotional and cognitive responses. As one prior study, this paper introduces research examining psychological mechanisms in interactive video content. The paper titled “The Impact of Perceived Interactivity on Purchase Intention in Interactive Video: A CAB-Based Chain Mediation Model of Empathy, Immersion, and Arousal,” published in August 2025,

demonstrates that perceived interactivity enhances viewers' empathy, immersion, and arousal. These emotional responses not only deepen the quality of the viewing experience but also influence behavioral intentions, such as purchasing intentions and social engagement.

Empathy plays a particularly important role in interactive films because the process of selecting and interpreting options strengthens emotional connections with characters. In conventional linear films, viewers remain observers of characters from a third-person perspective; in contrast, interactive works involve viewers in characters' decision-making processes, thereby increasing engagement and emotional identification. Such involvement may deepen understanding and interest in both characters and the social issues depicted, suggesting that interactive films can function as a means of "cognitive transformation" beyond entertainment. Furthermore, research on interactive fiction suggests that mechanisms enabling perspective-taking and experiential understanding of others' positions may contribute to reducing social prejudice and promoting empathy.

As a second prior study, this paper introduces "A Day in Their Shoes: Using LLM-Based Perspective-Taking Interactive Fiction to Reduce Stigma Toward Dirty Work," published in May 2025. This study developed an interactive fiction system using large language models (LLMs) to allow users to experience the perspectives of individuals engaged in socially stigmatized "dirty work," and examined its effectiveness. One hundred participants experienced LLM-generated narratives on four types of dirty work, engaging with the stories through choices that guided them through the protagonists' daily lives and struggles. The results showed significant increases in understanding, empathy, and feelings of connection toward these occupations, as well as a reduction in stigma. Many participants reported strong immersion and emotional resonance, and learning about workers' job satisfaction led to changes in occupational perceptions. However, the study also noted that insufficient contextual information in LLM-generated narratives could reduce realism or even reinforce existing stereotypes. Overall, the research demonstrates that perspective-taking interactive fiction is a promising and scalable approach for reducing stigma and promoting social understanding.

3-2 Discussion

These findings indicate that interactive films have the capacity to transform audiences from passive viewers into active participants in narratives. By making choices, viewers are more likely to feel a degree of responsibility for the outcomes, thereby enhancing immersion and emotional engagement. This structure represents a characteristic not found in conventional one-directional film expression.

Moreover, the effects of empathy and perspective-taking identified in prior studies are particularly significant for media representations addressing social issues. By participating in characters' decision-making processes, viewers are able to experience perspectives beyond that of a detached observer, leading to deeper understanding and increased awareness of the people and issues portrayed. As a result, shifts in perception are more likely to occur.

At the same time, as seen in LLM-based narrative generation, insufficient context or biased representations carry the risk of reinforcing inaccurate images. Therefore, when interactive films are used for awareness-raising purposes, careful design of realistic and balanced portrayals is essential.

4. Conclusion and Future Prospects

In conclusion, this study examined the effectiveness of interactive films as a new method for raising awareness of poverty-related issues. Because interactive films involve viewers in narrative choices and allow them to experience the consequences of those choices, they have the potential to generate stronger immersion and a heightened sense of personal involvement compared to conventional one-directional visual media. This characteristic is particularly meaningful for addressing issues such as poverty, which are often understood at a cognitive level but fail to translate into action. By positioning viewers as decision-making agents, interactive films offer a novel approach to fostering engagement.

Therefore, interactive films can be considered an effective awareness-raising tool that enables wealthy individuals to reframe poverty not as "someone else's problem," but as an issue connected to their own choices. At the same time, among the wealthy, there exists a group that understands the existence and structure of poverty yet hesitates to take action due to resistance to relinquishing their own living standards or vested interests. How interactive films can be structured—through scriptwriting and choice design—to engage such individuals remains an important issue for future research.

Specifically, further consideration is needed regarding how to depict situations in which no option is free from trade-offs or moral conflict, rather than presenting viewers with easily identifiable "correct" choices, and how extensively the social consequences of continuously avoiding disadvantage should be made visible. Designing narratives that allow wealthy viewers to reflect deeply on their own position and responsibility without becoming defensive represents a key challenge for future exploration.

5. References

Title of "The impact of perceived interactivity on purchase intention in interactive video: a CAB-based chain mediation model of empathy, immersion, and arousal"

Title of "A Day in Their Shoes: Using LLM-Based Perspective-Taking Interactive Fiction to Reduce Stigma Toward Dirty Work"

Reducing the number of slums in the world

- Temporary staffing and self-help to escape from slums-

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Research Summary

In order to eliminate slums, which pose numerous social problems, I believe that infrastructure development is essential, as well as providing slum residents with the skills they need to survive. Therefore, I thought that by sending engineers to slums and imparting these skills, residents could be empowered to escape poverty on their own.

1. Introduction (Background, Significance, and Purpose of the Research)

1-1 Social Trends (Current Situation and Issues)

According to the United Nations Human Settlements Programme (UN-Habitat), a household is classified as part of a slum if it lacks at least one of the following five conditions: (1) durable housing, (2) sufficient living space, (3) access to safe drinking water, (4) security of tenure to prevent forced eviction, and (5) access to adequate sanitation facilities. This definition highlights the multidimensional nature of slum environments, encompassing both infrastructural and socio-economic deficiencies.

The increasing population of slum residents has emerged as a critical global issue due to its significant negative impacts on society. As slum settlements expand, public health conditions tend to deteriorate as a result of overcrowding, insufficient sanitation systems, and limited access to clean water. Furthermore, persistent poverty within these communities may lead individuals to engage in unlawful activities or join criminal organizations as a means of economic survival. Consequently, the growth of slums may contribute to rising crime rates, including theft, armed robbery, and homicide, thereby posing a broader threat to societal stability and public safety.

These challenges suggest that slums adversely affect both the immediate living conditions of residents and the broader socio-economic environment. Therefore, the objective of this research is to explore strategies for addressing and ultimately eliminating slum conditions. Rather than focusing on temporary or surface-level solutions, this study aims to examine and resolve the structural and systemic root causes that contribute to the formation and persistence of slums.In general, slums tend to form in relatively urban areas within a given country. This is because individuals living in rural regions often struggle to sustain their livelihoods through agriculture alone and therefore migrate to urban centers in search of employment. However, not all of these migrants are able to secure stable jobs. Without employment, they cannot obtain a steady income, and consequently, they are unable to afford housing. As a result, individuals who lack a place to live, or who seek more

affordable living arrangements, begin to cluster together, eventually forming slum settlements.

According to the United Nations Regional Information Centre (UNRIC) SDGs Report 2024, the number of people living in slums, despite a gradual decline between 2022 and the previous two decades, is projected to reach approximately 1.1 billion. This figure represents about 12.5% of the estimated global population of 8.025 billion in 2023. Such projections indicate that, even with ongoing efforts to address slum-related issues, a significant number of people will continue to reside in slum conditions.

Living in slums presents numerous challenges. For example, one critical issue is that government involvement in slum areas is often limited or difficult. When government intervention is restricted, official sectors such as police and emergency services cannot properly operate within slum communities. Consequently, crime prevention becomes difficult, increasing the likelihood that slums will become havens for criminal activity. Additionally, the lack of accessible public services makes it challenging to provide medical treatment to injured or ill residents.

As previously noted, poor sanitation is another major concern in slum environments. Due to weak governmental presence and limited infrastructure development, basic facilities such as toilets are often inadequate or nonexistent. In some cases, residents rely on untreated river water for drinking, posing serious health risks. Such circumstances illustrate the systemic and ongoing issues faced by slum communities.

Given these extensive challenges, it is essential to explore and implement measures aimed at reducing the number of individuals who are forced to live in such environments.

1-2 Previous research 1

Habitat for Humanity, an international non-governmental organization (NGO), conducts support activities in more than seventy countries worldwide. Its initiatives include volunteer-based housing construction as well as providing educational opportunities for children who otherwise lack access to schooling. However, as a non-governmental organization, its capacity for intervention and long-term impact is inherently limited.

1-3 Research Questions

I believe that in order for individuals living in slums to escape such conditions independently, it is essential to provide them with employment opportunities through which they can acquire technical skills and practical knowledge necessary for

sustaining their livelihoods. However, implementing such an initiative on a global scale cannot be achieved solely by a small organization. Securing financial resources for housing construction, covering labor costs, and deploying skilled personnel all require governmental support. Yet, obtaining cooperation and funding from governments is not an easy task.

Therefore, the research question of this study is: *“What strategies can be employed to create an employment-provision system in collaboration with governments?”* Through this research, I aim to explore a framework that enables effective governmental involvement and support.

1-4 Hypothesis

As a hypothesis, I propose that obtaining governmental cooperation when dispatching personnel to slum areas requires providing some form of benefit to the government. Without such incentives, securing governmental support would likely be difficult.

2. Research method

As a research method, I plan to examine cases in which support initiatives have been implemented to eliminate slums and evaluate whether these efforts have been successful. Based on this analysis, I aim to develop a proposal that offers benefits for both governments and residents living in slum areas.

3. Research results and discussion

The idea I propose in this study is as follows**:** In return for deploying personnel and financial resources, the government would establish a state-owned enterprise in the designated slum area. Residents of the slum would then be employed as workers in this enterprise, which would allow the government to reduce labor costs. The profits generated from this operation would be returned to the government, thereby creating a mutually beneficial situation for both the government and the residents living in the slum.

4. Conclusions and future prospects

As a final conclusion, the answer to my research question is to create a system in which the government is motivated to provide support voluntarily—specifically, a system that offers financial incentives to the government. Moving forward, I intend to continue refining and improving my proposal to enhance its feasibility and effectiveness.

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How can AI help tackle the global mental health crisis?

～Focusing on the delivery of effective diagnosis to more people.

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Abstract

There are so many people who have mental illnesses, but many of them don't go to see a doctor, even though medical institutions can help treat them. Therefore, I would like to create an AI tool and release it on the Internet to make a lot of people who have mental illness know about their diseases and go to the hospital. To make it, I want to use the Internet to search for their and their families' needs. I found that I should ask someone to make an AI diagnostic tool.

1. Introduction

Living in Japan, I often see news on TV and the internet about celebrities taking time off work or committing suicide due to depression, so I became interested in how big a problem mental illness is around the world. Mental illnesses such as depression and schizophrenia can be cured with appropriate treatment at a hospital, but for various reasons, many people do not visit a psychiatrist. The patients and their families don't know the clear reasons why they have to go to the hospital. I want to solve this problem by utilizing AI. After that, we want more people suffering from mental illness to receive treatment, thereby reducing the overall number of mentally ill people and the number of suicides.

1-1. Social Context

I learned that approximately 300 million people worldwide suffer from depression, and nearly 800,000 people die by suicide each year. Figure 1 shows the number of patients with major mental illnesses.

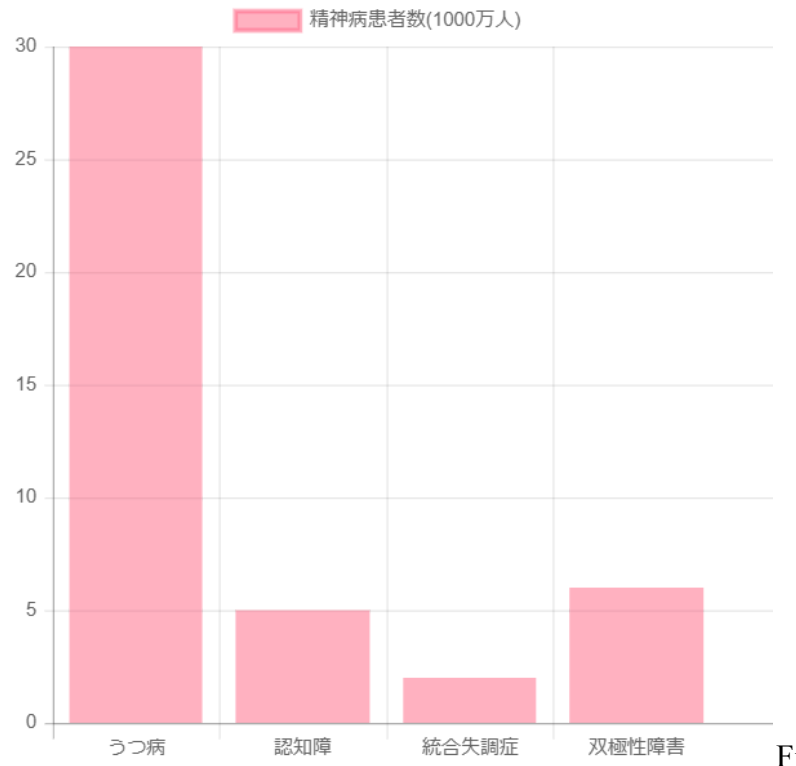

Figure 1 (WHO, 2018)

1-2. Previous Research

I referred to a paper by Shin Ikeda and the Okayama Psychiatric Medical Center (a local independent administrative institution). In this study, they searched PubMed, a medical research website, for several keywords related to psychiatry and AI. From the resulting articles, they examined the number of articles, the diagnoses and symptoms studied, the main research content, and the AI technologies utilized. Among the results, I will summarize what is currently known about my research topic. AI-based medical treatment requires a diagnostic criteria system to accurately diagnose various symptoms. However, existing diagnostic criteria are incomplete, and even in face-to-face consultations, the doctor's subjectivity influences diagnostic results. However, it has been stated that progress is expected in recent years in the development of new diagnostic systems based on biological evidence. Furthermore, the number of papers researching psychiatry and AI is increasing. Among the gaps and questions raised in this study were: While it is currently believed that humans and AI should cooperate to build a diagnostic system, is it impossible to advance treatment using AI alone once a proper diagnostic system is established? Also, is there a clear method for building an appropriate diagnostic system?

1-3. Research Question (RQ)

After reading the paper, I thought that I want to create tools that would allow all mental illness patients to feel comfortable confiding in a non-human AI about their current situation, understand their verbalized worries using a diagnosis that the AI makes based on a diagnostic system, and understand the actions they should take and why that is.

Therefore, I made this research question: Can AI-based mental health diagnostic tools help increase the number of medical examinees?

1-4. Hypothesis

In response to this research question, I formulated the following hypothesis: At present, it is difficult to provide AI medical treatment that is as effective as in-person medical treatment, in other words, to treat patients using AI alone. However, I believe that AI can be used to provide services to many people, such as checking the mental state of people who are on the verge of or already suffering from mental illness and helping them to see a psychiatrist, or listening to people who are troubled in a counseling-like manner. I believe it is possible to link this to an increase in the number of people receiving treatment.

To explain the reason why I make the hypothesis, I refer to a paper by Johanna Habicht, Sruthi Viswanathan, Ben Carrington, Tobias Hauser, Ross Harper, Max Rollwage, (London, UK). They made a conversational Al-enabled self-referral tool to close the accessibility gap to mental health treatment and tested it on some people. AI tools can increase the overall number of patient consultations, and the tools were particularly effective among minority groups, including non-binary, bisexual, and ethnic minorities. This means that minority groups experience barriers in traditional consultation methods (visiting a psychiatrist in person), which can be significantly alleviated by using AI tools. The study also found that the reason minority groups are more likely to seek treatment using AI tools is because the tools eliminate human intervention—meaning they confide their concerns and symptoms to an AI rather than a human—and because the tools can improve their awareness of the need for treatment.

2. Research Method

I searched what is needed for an AI mental health diagnostic tool to make everyone go to hospital and take counseling. After that, I prepared to make an AI tool by setting the details.

3. Results and Discussion

3-1 Results

I would like to write what is necessary to make an AI diagnostic tool. The premise is that AI can collect and process much more information than humans can. Therefore, I would like to first have the AI learn diagnostic criteria created by humans (such as DSM-III).Then, as it learns the diagnostic data of many patients, the ideal situation would be for the AI to gradually become aware of the trends in symptoms and be able to make appropriate judgments.

I found a website where doctors compiled cases of psychiatric illnesses, so I used it as a reference. There were many comments posted there by patients and their families. I was able to find a common thread. Patients and their families were suffering from their patients' symptoms without knowing the name of their illness. In other words, there were cases where patients were unsure whether they should go to the hospital because they didn't know the appropriate treatment or how to deal with the illness, and so they refused to go. Therefore, the AI diagnostic tool I create needs to clearly show the patient's current condition and the recommended actions, such as visiting a hospital, receiving counseling, or doing what you like (if a patient is diagnosed with no particular problem, it would be disrespectful to assume that they are fine because they have no symptoms).

Furthermore, there are several things that can be done to make this AI tool more widely available. For example, it would be possible to train it to use around 400 words in major languages with a relatively large number of speakers, allowing patients to select the language. It is also important to minimize the amount of information required to protect patient privacy. Necessary information includes the patient's symptoms, age, and gender, which are necessary for an accurate diagnosis.

3-2 Discussion

Based on previous research, we believe that creating and disseminating tools for diagnosing psychiatric illnesses using AI will be highly effective in increasing the number of psychiatric patients receiving treatment worldwide. Also, I learned that innovation is from everywhere. We can be creators just by thinking. Also, creative ideas are the most important in terms of work now. I decided to make a very simple AI diagnostic tool because I can’t think complexly. I would like to try to begin from an easy step. Someday, I can make an innovative tool.

If we go to the trouble of creating a system, it's pointless unless many patients continue to use it. For this reason, it's extremely important to provide accurate and detailed information free of charge and to eliminate the burden on patients (difficult operations, providing personal information, insensitive advice). I believe that utilizing AI is the perfect way to achieve this.

4. Conclusion and Future Prospects

Based on the above, I believe that creating an AI diagnostic tool that clearly shows a patient's current condition and the actions they should take, and making it available online, is necessary to increase the number of psychiatric patients receiving treatment. However, I have no programming knowledge and it is impossible for me to create the tool myself. Therefore, I would like to consider ways to create the tool in the future, such as paying a programmer to create it or using AI. I would also like to consider who should test the tool when it is released.

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A new vegetarian diet for the world
~A new proposal for combating global warming~

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1 Research Background

1-1 Social Trends

Global warming is a serious problem in SDGs, which is made to realize sustainable society in 2030. Recently, people are tackling the problem in a variety of ways. There're some activities which governments do or also which the individual do. I especially think if each person tackled global warming, the problem would be solved. In these social trends, people started to have new needs : people want to solve global warming. To answer the needs, I researched the way to solve the problem, which is easy for everyone to do. Vegetarianism has been gaining attention in recent years. Originally, vegetarians were defined as people with dietary restrictions for religious reasons, but recently there are various types of vegetarianism, such as those for weight loss or as a response to climate change. Our goal is to create a new type of vegetarianism that helps prevent global warming, and to increase the number of options that anyone can easily use to contribute to preventing global warming.

1-2 Previous Study

The study, "Health, environmental, and animal rights motives among omnivores, vegetarians, and vegans and the associations with meat, dairy, and egg commitment," investigated how the three primary dietary motives—personal health, environmental impact, and animal welfare—predict the actual commitment to consuming meat, dairy, and eggs across different dietary groups. The research revealed that while omnivores rated health as the most important motive for considering reduction, it was ultimately environmental and animal rights motives that were significantly associated with a reduced commitment to eating meat, dairy, and eggs within this group. This finding suggests a critical gap between perceived reasons and the true drivers of behavioral change. Vegetarians, as expected, were more strongly driven by environmental and animal rights concerns than omnivores, yet their commitment to excluding dairy and eggs was notably weaker than that of vegans, highlighting a lower intensity of animal rights motivation compared to the vegan group, especially concerning these specific products. Crucially, the commitment to avoiding dairy and eggs among vegetarians was associated only with animal rights motives, confirming that the ethical dimension is the primary barrier to the consumption of these particular animal products. In contrast, the commitment to avoiding meat was influenced by both environmental and animal rights concerns. These results underscore the necessity of tailoring advocacy efforts: for omnivores, focusing on environmental and ethical consequences is likely more effective for promoting lasting change than solely promoting health benefits, while promoting a fully plant-based diet to vegetarians requires a specific emphasis on the animal welfare issues tied to dairy and egg production.

1-3 Research Question:

How can a new form of vegetarianism, considering religious, cultural, and regional dietary differences, be promoted as an effective strategy to reduce environmental impact and combat global warming?

1-4 Hypothesis and verification method

We will formulate hypotheses about the specific elements necessary for a vegetarian diet that can contribute to preventing global warming. This time, we will create a new vegetarian diet aimed at Japanese people, following our exploration of Japan.

First, we believe that the base diet should be Japanese cuisine. Japanese cuisine is a traditional culture that Japan is proud of, and is registered as a UNESCO Intangible Cultural Heritage. We believe that Japanese cuisine is an essential part of our diet, and by including it as an element of vegetarianism, we can make it easy for any Japanese person to adopt. One way to verify this is to look at how often Japanese people currently eat Japanese cuisine and consider whether they are consuming it more than other food cultures.

Next, if Japanese cuisine is found to be an element that should be included in a new vegetarian diet, we believe that meat-free foods should be considered vegetarian. The difference in greenhouse gas emissions between meat and other ingredients is obvious, and reducing meat consumption is directly linked to preventing global warming, so it should be included as a factor. The verification method will involve examining greenhouse gas emissions by type of meat and by type of other food ingredient, and considering whether or not these should be included as elements of a new vegetarian diet.

Finally, we believe that an element that should be included in a new vegetarian diet should be eating the same number of meals per week as the current average frequency of Japanese food consumption. The verification method will involve considering how much of a reduction in greenhouse gas emissions can be expected if a new vegetarian diet incorporating the above elements is adopted.

2. Practice and Discussion

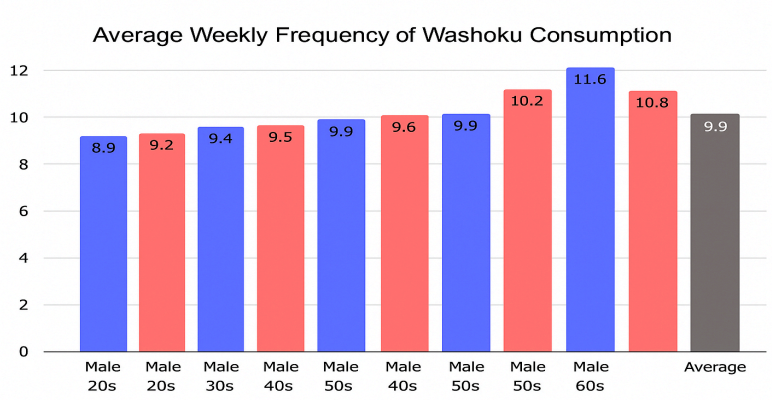
Based on the findings of this study, three criteria were established as the core elements of a new form of vegetarianism:

1. The dietary foundation must be based on traditional Japanese cuisine (washoku).
2. Among the components of washoku, beef must not be used.

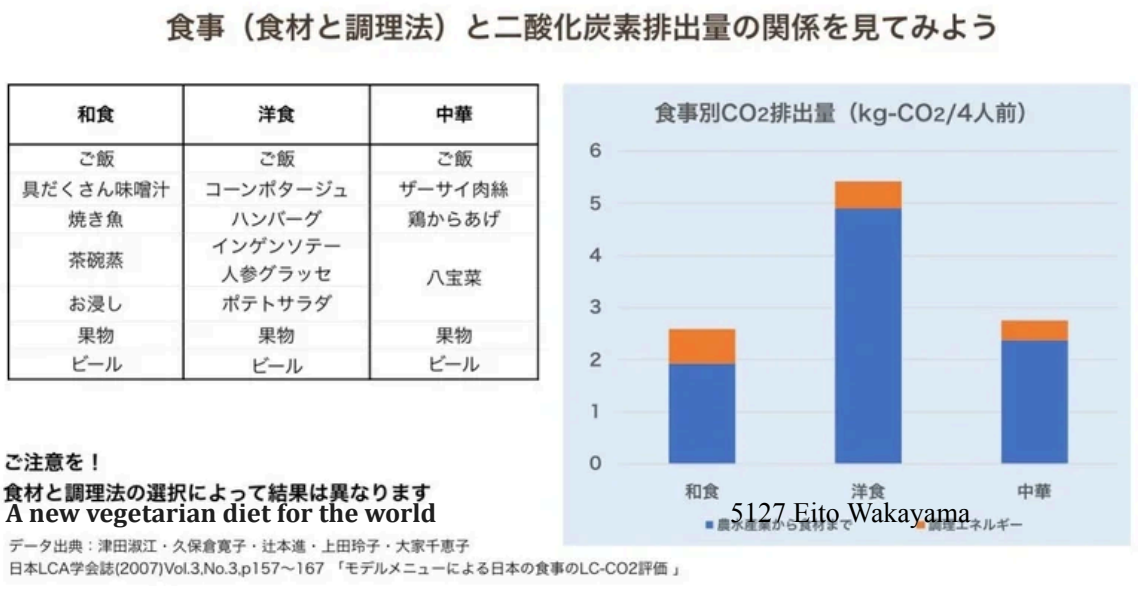
Meals meeting criteria (1) and (2) should be consumed at least ten times per week.

These criteria constitute the definition of a new dietary practice, which I name **“Watarian”**

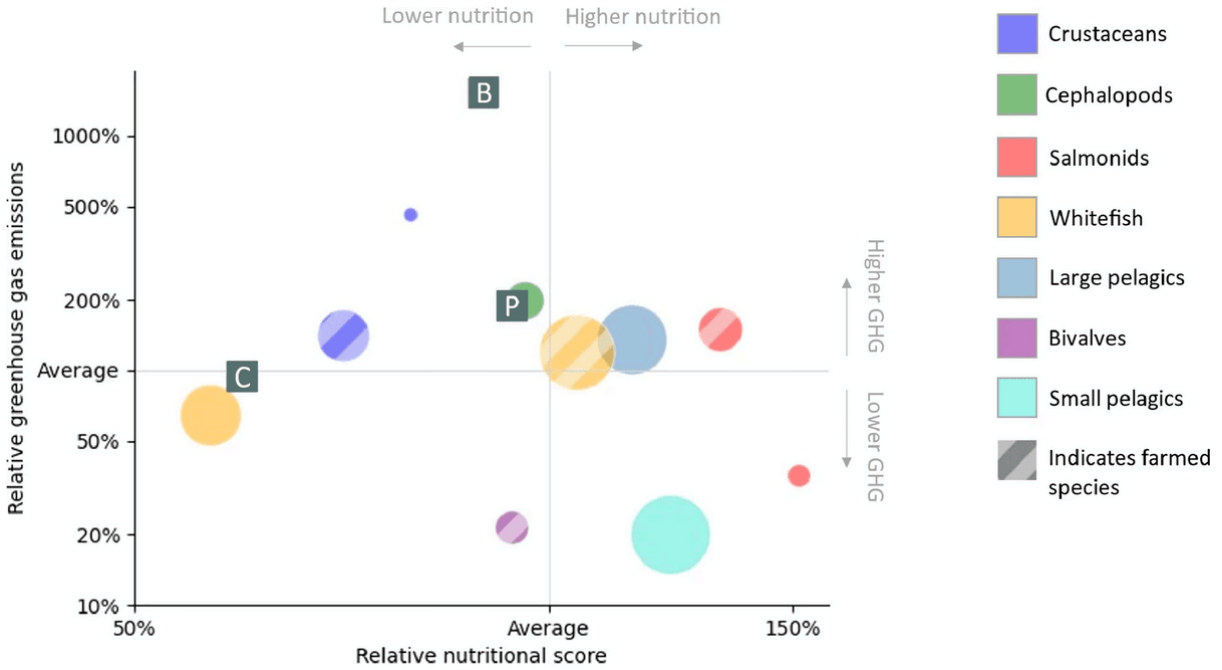
This research was conducted as part of an exploration of Japanese culture; thus, the aim was to consider a form of vegetarianism that would be adoptable and familiar to Japanese people. Naturally, *washoku*, Japan's traditional food culture, emerged as a highly relevant dietary base. In fact, washoku was inscribed on UNESCO's Intangible Cultural Heritage list on December 4, 2013. According to the Ministry of Agriculture, Forestry and Fisheries, the registration was justified by the cultural and traditional significance of washoku, highlighting its deep-rooted presence in Japanese daily life. Furthermore, a survey conducted by Recruit Lifestyle Co., Ltd. (10,002 respondents aged 20–69 in the Tokyo, Kansai, and Tokai metropolitan areas) found that Japanese adults consume washoku an average of 9.9 times per week, with men in their 60s consuming it most frequently at 11.6 times per week. This means that Japanese people choose washoku for roughly half of their weekly meals, demonstrating its familiarity and cultural importance.



In addition, washoku is known to have a relatively low environmental impact compared with Western or Chinese cuisines. Because it typically uses fewer resource-intensive ingredients, washoku contributes to reduced CO_2 emissions. For these reasons—its cultural familiarity and environmental benefits—washoku was selected as the foundation of the new vegetarian category.

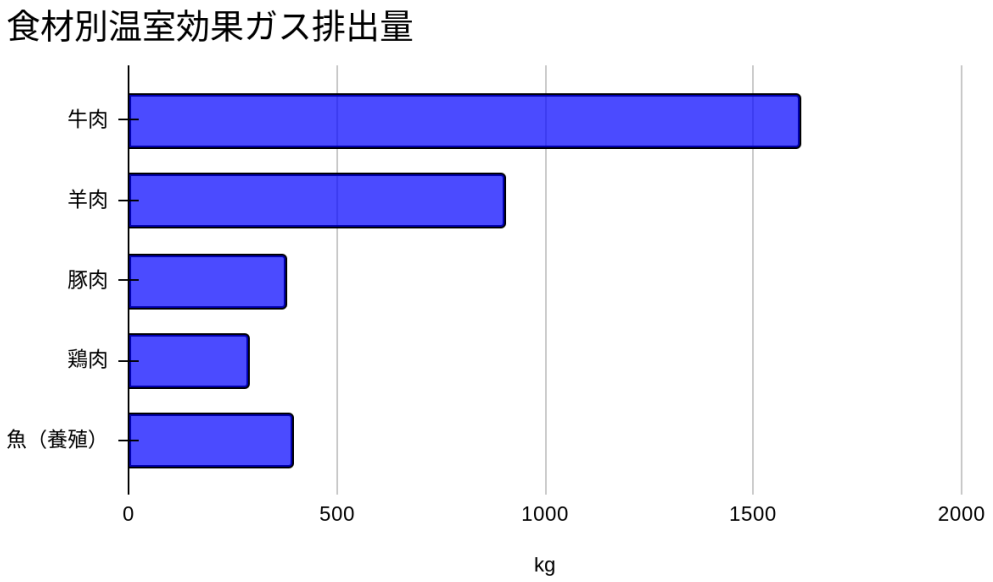


Although washoku generally has a lower environmental impact, not all dishes or ingredients contribute equally to sustainability. To identify environmentally burdensome ingredients, this study examined data on greenhouse gas emissions by food type. The dataset was produced by Peter Tyedmers and his research team at Dalhousie University, who evaluated both environmental impact and nutritional value. In their analysis, the vertical axis represents environmental scores, the horizontal axis represents nutritional scores, and circle size indicates nutritional density. Beef (indicated as “B”) was shown to have the highest environmental burden, significantly exceeding that of all other food categories. In contrast, small fish such as sardines exhibited the lowest impact. Ranking the ingredients by their environmental burden from highest to lowest yields the following order: beef, crustaceans, cephalopods, pork, pelagic fish, farmed salmon, farmed crustaceans, farmed white fish, chicken, wild white fish, salmon, farmed bivalves, and finally small fish. Beef, in particular, produces nearly twice the emissions of crustaceans, the second highest category. Because the difference in environmental impact between beef and other ingredients is substantial, simply excluding beef dramatically reduces the overall environmental footprint of a diet. Therefore, Criterion (2) of Watarian requires that no beef be used, contributing directly to climate change mitigation.



To evaluate how much environmental impact Watarian could reduce in practice, this study compared the greenhouse gas emissions of a typical diet including beef 3–5 times per week with a Watarian diet in which beef is replaced with alternative ingredients. Emission values were estimated using the BBC’s “Climate Change Food Calculator. The

results indicate that consuming beef 3–5 times a week results in approximately **1,611 kg** of greenhouse gas emissions per year. By contrast, the emissions for substituting beef with other proteins range from **904 kg** for lamb to **285 kg** for chicken. Therefore, eliminating beef from 3–5 weekly meals can reduce emissions by approximately **707–1,326 kg** per person per year. Combined with data showing that washoku itself has a lower carbon footprint than many other dietary cultures, it can be concluded that Watarian has meaningful potential to contribute to climate change mitigation.



3.Conclusion and Future Prospects

This study demonstrates that the Watarian dietary model has significant potential to mitigate global warming through culturally grounded and environmentally conscious eating practices. Although the calculations presented are approximate, they clearly indicate that adopting Watarian can meaningfully reduce individual greenhouse gas emissions. For example, an individual who practices Watarian for one year could reduce emissions by approximately 707 kg (see Section 2). While this estimation was originally contextualized within Japan, the implications extend far beyond national boundaries. In a world where food-related emissions account for a substantial portion of total greenhouse gas output, even small dietary shifts adopted on a global scale could produce considerable environmental benefits. If Watarian were to be adopted internationally—particularly in regions where beef consumption is high—the cumulative reduction in emissions could be extremely significant. Therefore, the future challenge lies in how to introduce and promote the concept of Watarian globally. To achieve this, several steps will be necessary: Presenting

Watarian not merely as a Japanese cultural practice but as a flexible, environmentally oriented dietary model adaptable to diverse food cultures. Communicating its benefits in terms of sustainability, accessibility, and health. Encouraging cross-cultural collaboration in research and educational outreach.By positioning Watarian as a globally relevant dietary approach, it may contribute to fostering international awareness of sustainable eating habits. Ultimately, widespread adoption—even partial—could inspire meaningful progress toward global climate goals. In conclusion, the hope of this study is that Watarian will not only take root in Japan but also serve as a global movement promoting environmentally conscious food choices. With shared effort and international cooperation, Watarian has the potential to become a worldwide step toward a more sustainable future.

4,Reference

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To stop desertification

～To protect humanity

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To stop desertification ～To protect humanity～ 5201

Abstract
Restoring land that has become desertified due to drought or human development, where plants no longer grow.

1. Introduction (Background, Significance, and Purpose)
In my fourth-year research on desertification, I hope to delve deeper this year—not only into the causes of desertification but also into the specific characteristics of desertification occurring in each region.

1-1. Social Context (Current Situation and Problems)
Desertification remains a serious environmental issue today, with much of southern Africa suffering significant damage. Furthermore, desertification leads to global warming because it causes land to become barren—meaning plants can no longer grow. I thought that if desertification were solved, vegetation would increase, potentially improving the global warming problem somewhat.

1-2. Previous Research

Previous research on desertification shows that land degradation is shaped by climate change, population pressure, and unsustainable land use. Shuichi Oyama (Kyoto University) emphasizes that scientific solutions must be combined with community-based approaches.

Many studies also note that in countries like Niger and Brazil, local residents often lack knowledge about sustainable land management. This knowledge gap contributes to practices such as overgrazing and deforestation. Although various projects propose solutions, they are not always adopted locally due to limited awareness or lack of training. This gap leads directly to my research focus on strengthening local knowledge as a central factor in combating desertification.

1-3. Research Question (RQ)

RQ: How can improving local knowledge and participation enhance the effectiveness of anti-desertification strategies in countries such as Niger and Brazil?

This question is important because desertification affects both livelihoods and local economies. UNCCD data shows that over 250 million people are impacted globally, highlighting the need for community-based solutions.

1-4. Hypothesis

Hypothesis: Anti-desertification projects are more effective when they include local knowledge development and community participation, rather than relying solely on

external technical interventions.

This hypothesis is supported by studies showing that regions with strong community involvement—such as training programs in Brazil—achieve better long-term outcomes. Oyama's work also indicates that empowering residents leads to more sustainable land-use practices.

2. Research Method

This study used a comparative literature analysis of Niger and Brazil. Academic papers, UNCCD reports, and case studies were reviewed.
The process included:

Reviewing scientific literature on desertification.
Analyzing community-based projects in both countries.
Comparing areas with strong vs. weak local knowledge.
Examining the role of education and community cooperation.

This allowed the hypothesis to be evaluated through cross-case patterns.

3. Results and Discussion

3-1 Results（結果）

Local knowledge gaps are significant. In Niger, many residents misunderstand the causes of land degradation.
Education-based projects succeed more often. Brazilian regions with community workshops showed much higher adoption of sustainable practices.
Collaborative projects last longer. Community-driven initiatives were more sustainable than externally led ones.

These results support the hypothesis. Where residents understood desertification causes and actively joined projects, outcomes improved. Niger's challenges relate partly to low awareness, while Brazil shows that training encourages voluntary adoption of better methods.

Globally, research indicates that technical solutions alone fail to change long-term behavior. Innovation in desertification efforts must include education, local leadership, and culturally appropriate communication. Community-centered strategies appear essential for sustainable land restoration.

4. Conclusion and Future Prospects

This study concludes that improving local knowledge and participation is crucial for effective

anti-desertification efforts. Education-based approaches produce better results than externally imposed strategies.

Future efforts should focus on long-term training programs, participatory land management, and cooperation between governments, NGOs, and communities. I also plan to explore how simple technologies could support remote-area education. Empowering local people is key to sustainable and resilient land restoration.

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大山修一　アジア・アフリカ地域研究研究科教授「偶然を必然に変える」｜京都大学新聞社／Kyoto University Press
UNCCD

Protecting the Rights of Same-Sex People

～Whether same-sex couples should be allowed to have children~

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This study explores how to support the healthy development of children raised by same-sex couples. Although countries differ in their legal recognition of same-sex families, Japan still does not allow same-sex marriage, which may limit family stability and children’s rights.

Previous studies show mixed results, but these differences are mainly due to variations in children's birth backgrounds, family stability, and research methods. Studies on children born into same-sex families through reproductive technologies differ greatly from those involving children who experienced divorce before entering a same-sex household.

Overall, the findings suggest that children's well-being depends more on legal protection, social support, and stable family environments than on parents' gender. This study therefore examines what legal and social measures can better support children in same-sex families.

In recent years, developments concerning same-sex marriage have progressed in diverse ways across different countries. In Japan, however, a court ruling delivered in November of this year held that the non-recognition of same-sex marriage is constitutional. Entering into a legally recognized marital union grants individuals access to a range of rights and benefits. Denying these rights solely on the basis of sexual orientation, therefore, has been criticized as a violation of the principle of equality under the law. This raises an important question: what forms of legal and institutional reform are necessary to ensure that same-sex couples can obtain these rights on equal terms?

From Kazuko Iketani's paper "The U.S. Supreme Court Decision and Issues with Same-Sex Marriage": "The debate over whether to recognize same-sex marriage fundamentally hinges on how we define the institution of marriage itself." Proponents of same-sex marriage define it as "an essentially private, intimate, and emotional relationship undertaken for one's own happiness, created by the couple themselves for their own sake." Opponents, however, seem to define marriage as a social institution: "Marriage is a union unique to men and women, serving to maintain long-term family relationships while ensuring 1) safe sexual relations, 2) responsible childbirth, 3) optimal child-rearing, 4) the development of healthy interpersonal relationships, and 5) the protection of the roles of wife and mother."

"This definition of marriage, viewing it as "a private act performed solely for the couple's own happiness, with the couple themselves as the protagonists," inevitably leads to the breakdown of the family. This is because it implies that couples who don't want to marry can simply cohabit, that couples who marry but lose their intimate feelings can just divorce, and that infidelity during marriage is acceptable if both parties consent. This could even lead to questioning why polygamy or incest are wrong (if the parties consent). Furthermore, it risks interpreting even having children as a form of self-determination—for instance, in cases where someone wants children but not a spouse, or where a same-sex couple desires children."

What efforts can be made to support the healthy development of children in same-sex couples?

Establish an organization to support same-sex couples in adopting children placed in children's homes. We need to consider something for the mental care of children adopted by same-sex couples.

【Protecting the Rights of Same Sex People】 5202 Chihana-3

Researching international trends in joint adoption by same-sex couples using academic papers.

I found different conclusions during researching Children's low levels of happiness stem from the fact that they were born to opposite-sex parents, yet their parents are now in same-sex relationships. However, with the increasing use of surrogacy and artificial insemination, this concern may become unnecessary.

I researched what developments are occurring in other countries regarding the joint adoption of children by same-sex couples. From Yuto Sakuma's paper "Same Sex Marriage : Movements in various countries": "Spain allows same-sex married couples to adopt children in the same way as opposite-sex couples, but the presumption of legitimacy applies only to opposite-sex marriages"."Belgium initially excluded same-sex couples from both the presumption of legitimacy and adoption rights, but a 2006 legal reform granted them access to adoption". "Portugal did not permit same-sex couples to adopt in 2010, but a 2013 reform allowed stepchild adoption by married same-sex partners". "The Netherlands legalized same-sex marriage in 2001, becoming the first country to do so. Although early differences remained—such as the lack of international adoption rights and the non-application of the presumption of legitimacy—subsequent reforms (2001 and 2005) expanded parental rights for same-sex couples, except that the presumption of legitimacy still does not apply to male couples".

The APA's 2005 report concluded that children raised by same-sex parents show no psychological or social disadvantages compared to those raised by heterosexual parents. However, subsequent scholars have challenged the methodological basis of this claim. Lauren Marks criticized the APA's reliance on studies with small sample sizes—over 77% involving fewer than 100 participants—and its failure to compare outcomes with those from intact biological families. She argues that the available evidence is insufficient and that long-term, large-scale studies are needed.

Further empirical work has produced contrasting results. Using data from roughly 3,000 adults in the New Family Structures Study, Mark Regnerus found that individuals raised by gay or lesbian parents reported more difficulties, including lower academic performance, higher marijuana use, greater incidence of arrest, increased exposure to unwanted sexual contact, and higher rates of infidelity, compared to those raised by continuously married biological parents. He noted that the most favorable outcomes appear among individuals who spent their entire childhood with married biological parents.

Paul Sullins, analyzing 1.598 million respondents from the National Health Interview Survey, likewise reported higher rates of emotional problems among children of same-sex parents. Measures based on the Strengths and Difficulties Questionnaire and parental interviews showed that emotional or behavioral issues occurred at more than double the rate found in heterosexual-parent households, with elevated levels of ADHD, learning disabilities, and other developmental challenges.

These studies collectively argue that, contrary to the APA's position, children raised by same-sex parents may face higher risks in certain developmental domains, and that previous affirming conclusions were limited by methodological constraints.

The analysis of previous studies suggests that the conflicting findings regarding children raised by same-sex couples are not primarily the result of parental sexual orientation itself. Rather, these discrepancies can largely be explained by differences in children's birth backgrounds, the stability of family structures, and methodological choices in research design.

A considerable number of early studies categorized children as having been "raised by same-sex parents" even when they were originally born to heterosexual couples and later experienced divorce, separation, or multiple subsequent family transitions before one parent entered a same-sex relationship. The psychological or behavioral difficulties observed in such cases can be more plausibly attributed to family instability than to the gender composition of the parents. In contrast, recent studies increasingly focus on children born directly into same-sex couple households through reproductive technologies such as artificial insemination or surrogacy. These families tend to provide more stable environments, indicating that earlier findings may not be applicable to contemporary same-sex families whose formation processes differ significantly.

A similar pattern emerges in cross-national comparisons. Apparent inconsistencies—for example, differences in adoption rights among Spain, Belgium, Portugal, and the Netherlands—are better understood as temporary effects of asynchronous legal reforms rather than fundamental value differences across countries. In many cases, the legalization of same-sex marriage preceded revisions to parent–child laws, creating transitional gaps that were later resolved through subsequent reforms.

Methodological variation also plays a crucial role in shaping research outcomes. The APA's 2005 report relied on small samples and comparisons with "typical" heterosexual families, whereas later studies by Regnerus and Sullins used continuously married biological parents, one of the most stable and resource-rich family types, as the reference group. Such differences in comparison standards naturally influence the magnitude and direction of observed effects. Additionally, some later studies have been criticized for including participants who experienced several family transitions despite being classified as raised by same-sex parents, which further complicates interpretation.

Taken together, these considerations indicate that the question of whether being raised by same-sex couples is harmful cannot be meaningfully addressed in isolation from the conditions under which children were born, the degree of family stability, and the methodological assumptions embedded in each study. Simplified conclusions overlook the complex ways in which these factors interact.

From this perspective, efforts to support the development of children in same-sex families should

focus not on family structure itself but on enhancing legal security and social support, which help promote stable environments. Measures such as establishing second-parent adoption or joint legal parenthood, strengthening anti-discrimination initiatives in schools and medical settings, and expanding inclusive parenting support services are likely to contribute to children's well-being regardless of parental gender composition.

Future research will need to reflect the rapidly changing landscape of family formation and reproductive technologies. Longitudinal and large-scale studies that capture the realities of contemporary same-sex families will be essential for deepening our understanding of children's developmental outcomes in these contexts.

This research addressed the question: "What efforts can be made to support the healthy development of children in same-sex couples?"
Based on the analysis of previous studies, the most consistent finding is that children's well-being is shaped not by the gender composition of their parents but by the stability, legal security, and social support surrounding their family environment. Earlier studies that reported negative outcomes often included children who had experienced major family disruptions, whereas recent studies of children born directly into same-sex couple households indicate that a stable environment can support healthy development. Therefore, the most effective efforts society can make are those that strengthen legal recognition, social inclusion, and access to support services for same-sex families.

The current answer to the research question is as follows:
To support the healthy development of children in same-sex couples, society should focus on ensuring stable and secure family environments through legal protections, anti-discrimination measures in education and healthcare, and inclusive community support systems.

This conclusion has important implications. It suggests that debates about same-sex parenting should move away from assumptions based on parental gender and instead focus on what genuinely affects children's well-being—stability, safety, and equal access to resources. If legal and social frameworks are improved, children in same-sex families can grow up with the same opportunities and security as their peers. This perspective also challenges policymakers and educators to reconsider outdated assumptions and to adopt evidence-based practices that reflect contemporary family structures.

As a researcher, I should continue to deepen my understanding of how legal systems, school practices, and social attitudes affect children in diverse family forms. This includes examining

more recent empirical studies, following international policy changes, and developing a clearer framework for evaluating child well-being that accounts for variations in family formation and stability. I can also contribute by raising awareness within my own community—through writing, presentations, or discussions—that family diversity is a normal and legitimate part of society.

Other researchers should prioritize long-term, large-scale, and methodologically transparent studies that reflect current reproductive technologies and modern family structures. Policymakers should work to close legal gaps—such as unequal parental recognition—so that children in same-sex families are fully protected. Educators and practitioners should undergo training that equips them to support students from diverse families without bias. Society as a whole should strive to foster an environment in which no child faces stigma or disadvantage because of their family structure.

By placing the focus on children's best interests and the structural conditions that support them, future work can contribute to creating a society in which all families—regardless of parental gender—have the opportunity to thrive.

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Global English

～Improving English Education in Non-English-Speaking countries～

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Abstract

I started this research to raise the standard of English education in Non-English-speaking countries. I used not only information on the internet but also a company visit in Singapore to consider what kind of education is needed for students to master English in school. As a result of my research, at school, it is necessary to give students more opportunities to speak English actively. For that reason, I make four proposals to solve this problem.

1. Introduction (Background, Significance, and Purpose)

It is said that Japanese tend not to speak English. That is because Japan is an island nation so that many Japanese needn't speak Japanese. However, we have been learning English at school since we were in elementary school. Therefore, I wonder if it is possible that the education in each school makes students speak English, the world's common language, smoother and more direct across borders.

1-1. Social Context (Current Situation and Problems)

The appearance of AI enables us to do various things, but I believe that the communication among people is something AI cannot replace. That is because human communication is not only through words, but also facial expression, voice color, and so on, which AI cannot catch.
In modern society, we all have a chance to interact with foreigners freely on the internet. We mustn't hesitate to learn English today.

1-2. Previous Research

(1)『The development and validation of English communicative competence model for high school students in Korea』/ Whyun Young Choi and Mun-Koo Kang

The goal was to structure "practical English skills" that cannot be measured by grammar-centered education and to lay the foundation for curriculum and assessment improvement. And the following elements were shown to be valid as a framework for comprehensively assessing high school students' English communication skills.
①Linguistic competence
②Sociolinguistic competence
③Strategic competence
④Pragmatic competence
In teacher training and curriculum development as well, building a nationally tailored model based on the CEFR is effective.

《For my research》
A "model of English proficiency" that can be applied in other highly educated countries, including Japan, can be cited as a theoretical foundation.
This research can provide scientific evidence for English education policy and curriculum

evaluation.
However, more communicative activities are needed, I feel.

1-3. Research Question (RQ)

What kind of education is needed for students to master English in school?

Some countries, including Korea, Japan, and Russia, have a significant gap between English speaking abilities and education standards. This indicates that English education in such countries needs to improve their approach.

1-4. Hypothesis

I formed a hypothesis that it is good way to suggest these ideas below:
1, To start learning English at an earlier grade in elementary school,in the 1st grade
2, To create tools for students to converse with overseas students
3, To enhance short-term exchange programs
4, To develop a domestically tailored model based on the CFER
To improve English skills, I'm sure that these points can be effective. In particular, I added a fourth proposal based on previous research.

2. Research Method

・Researching on the internet
__What do countries with low English proficiency levels have in common?
・Looking for English reports
__Has any research been conducted to support or improve that?
・Company visit at Singapore
__Still, there are people who can speak English in these countries. What did they do?

3. Results and Discussion

3-1 Results

EPI shows the English Proficiency Index of almost all countries around the world. According to the official site, this is based on test data from over 2.1 million test-takers who have taken the EF Standardized English Test (EFSET) or the English Proficiency Test. The EF SET is an adaptive English test that measures reading and listening skills and can be taken online. It is designed to classify examinees' language proficiency into the six levels defined by the Common European Framework of Reference (CEFR). The EF SET is available free of charge to all internet users.

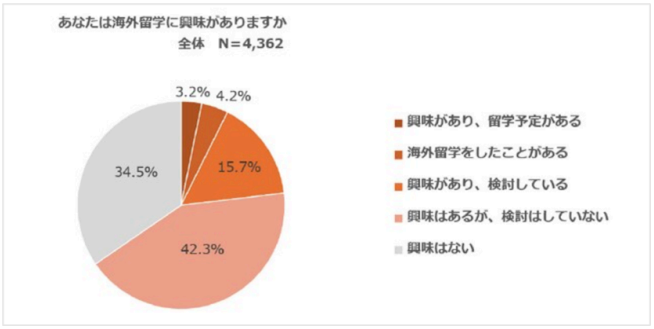
The sample of test takers for the EF EPI English Proficiency Index tends to consist of individuals motivated to learn languages and young adults, but it includes adult language

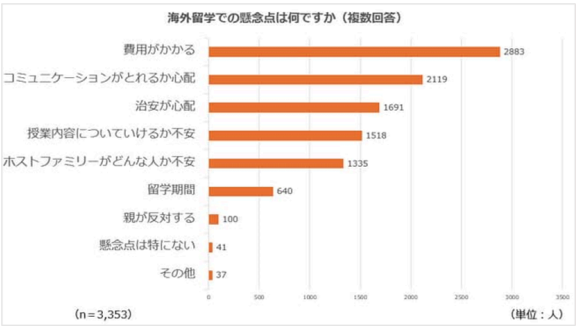
learners across a wide age range with no gender imbalance. The Netherlands has the highest English proficiency among non-English-speaking countries. Remarkably, 94% of its citizens are bilingual, and 77% are multilingual. This reflects a variety of factors. The reasons include compulsory education from age 4 to 16, a long learning period, high English proficiency among teachers, and the recognition of educational freedom. Through these efforts, schools are not only using English across all subjects but also implementing communicative and enjoyable lessons at each school.

OECD(Organization for Economic Cooperation and Development) shows data on educational standards in various countries. According to this, countries like Finland, Australia, and Sweden seem to boast world-class education standards. In countries such as South Korea, Japan, Russia, and France, a serious situation has occurred where English proficiency remains poor despite educational standards being among the world's highest. The main commonalities in English education across these countries include: ・Starting in the third grade of elementary school ・Focusing primarily on reading and writing, with limited instruction on speaking and practical usage

3-2 Discussion

After receiving advice from an entrepreneur in Singapore and university students, we focused our proposals down to two in order to increase opportunities for more communicative activities. That is: 1, To create tools for students to converse with overseas students
2, To enhance short-term exchange programs
The former is useful as an online activity and the latter is as a face-to-face activity.
I will discuss these two proposals in detail below.
[Connecting App]
There are several apps that still allow you to connect with people worldwide via video chat, but they also come with many risks. National agencies specializing in education (equivalent to Japan's Ministry of Education, Culture, Sports, Science and Technology) from various countries will collaborate to develop tools exclusively for students. Features such as requiring registration exclusively through the school, customizing the languages, regions, grade levels, genders, etc. you want to connect with, and installing a permanent emergency button that can be pressed at any time in dangerous situations should enable safe, needs-based use for students.
[Short-term exchange programs]





This is the result of a survey regarding study abroad among students.
While over 60% of students express interest in studying abroad, it is also clear that they have various concerns. Therefore, I propose expanding exchange programs, which are more affordable than other options and eliminate the need to worry about credits from one's home university.
Furthermore, by making exchange programs available in one-month units instead of the standard one-year duration, we can offer study abroad opportunities that are easier to participate in.

4. Conclusion and Future Prospects

There are still challenges ahead.
・How much does it cost to develop this app?
・How much English can you learn through a short-term study abroad program?
I will consider the extent to which it is achievable and enhance the specificity of these proposals.

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【報道発表】1008トビタテ調べ海外留学に関する意識調査について_2024.pdf | Powered by Box

円安でも、学生の約7割は海外留学に興味があることが判明！海外志向が強いのは男性より女性！？海外で働くことへの興味がある人は約5割の結果に | 株式会社ジェイ・エス・ビーのプレスリリース

Education Beyond the Classroom

～The Role of Picture Books～

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Abstract

This study examines whether logographic recognition—identifying words as holistic visual patterns—can support early literacy development in alphabetic languages. The research focuses on children who have limited access to formal schooling and proposes picture books as an accessible multimodal learning tool. Existing findings from NPO EDGE's BEAM audio-learning program were reviewed to analyze how visual features, text–image alignment, and audio support influence comprehension. The BEAM data showed that pairing written text with audio significantly improved reading comprehension, particularly for children with dyslexia, and also enhanced motivation and school adjustment. In picture books, repeated word exposure and consistent visual structure were found to facilitate visual word recognition, while unstructured designs were less effective. These results suggest that intentional picture book design—especially when combined with audio read-aloud functions—can provide an effective pathway to early literacy even without formal phonics instruction. Future work should include empirical testing with children, broader analysis of picture books, and exploration of digital or interactive formats to enhance learning accessibility.

1. Introduction (Background, Significance, and Purpose)

I am interested in competitive karuta and also participate as a player. Among the players, some began practicing as early as the age of three. Since they were not yet able to read or write hiragana at that age, they have said that they recognized the characters not as sounds but as visual forms or shapes. In other words, rather than reading each hiragana character individually, they identified them by their overall layout or by the combination of characters. This is similar to how adults can remember foreign-language signs—not by understanding their meaning, but by recalling their visual appearance. This method makes full use of visual memory, and it is said that younger children are particularly adept at learning in this way.

Through my interest in visual memory, I discovered a tool designed for foreign learners that allows them to study hiragana using child-friendly illustrations. This tool displays an illustration corresponding to each hiragana character, enabling intuitive, visually based learning. After exploring various aspects of visual memory, I came to think that children who are unable to attend school might still be able to learn written language through the use of visual memory. Furthermore, I believe that reading picture books could allow them to learn in an enjoyable and engaging way. This study will target children between the ages of three and eight.

1-1. Social Context (Current Situation and Problems)

By utilizing visual memory, it may be possible to help children who are unable to receive formal education learn to read written characters. The global literacy rate is approximately 87%, but there are significant disparities among countries, regions, and between genders. While regions such as Europe, East Asia, and the Pacific have high literacy rates exceeding 95%, rates remain low in parts of Africa, where women in particular tend to have lower literacy levels compared to men. According to data from 2020, the global literacy rate among men aged 15 and over was 90%, while that of women was 87%. In regions such as Africa, the gap is even more pronounced, with literacy rates of 72% for men and 59% for women. Countries with particularly low literacy rates include South Sudan (34.5%), Chad (22.3%), Afghanistan (37%), and Mali (33%). Given that women tend to have lower literacy rates than men, I thought that using picture books for learning to read and write might be more suitable for women than for men, and therefore effective.

1-2. Previous Research

I reviewed the paper “Reading Aloud, Self-Regulation, and Early Language and Cognitive Development in Northern Brazil” as part of the literature informing my research. This study introduced the UBB (Universidade do Bebê) shared reading program, developed collaboratively by researchers in Brazil and the United States. The UBB program builds upon strategies from “Reach Out and Read” and the “Video Interaction Project”, combining monthly workshops for parents with a book-lending library. The findings demonstrated that even when parents possess limited formal education, participation in the UBB program can positively influence parenting practices as well as children’s language, cognitive, and socio-emotional development. Consistent with research conducted in high-income countries, this study provides evidence that promoting parent–child shared reading is also of great importance in low- and middle-income contexts.

Drawing on these findings, I decided to focus my own research on low- and middle-income countries. Previously, I had regarded shared reading primarily as a means to enhance vocabulary acquisition and cognitive development—essentially, as an educational tool. However, the paper revealed that shared reading not only supports language development but also fosters children’s self-regulation, which plays a mediating role in further language and cognitive growth. This insight broadened my perspective from viewing shared reading merely as language education to understanding it as a form of developmental support that strengthens the foundations of children’s emotional and cognitive growth. Moving forward, I aim to

conceptualize shared reading, both in research and practice, as an activity that promotes parent–child interaction, emotional development, and the cultivation of self-regulation skills.

1-3. Research Question (RQ)

In alphabetic language contexts, both primary education and second language instruction commonly emphasize phonics-based approaches to reading, which focus on phonemic awareness and letter–sound correspondence. However, in languages such as English, where the relationship between spelling and pronunciation is highly irregular, phoneme-based learning is not always effective. Research has reported that children with dyslexia and learners of English as a second language often experience difficulties in vocabulary acquisition and word recognition when relying solely on phonological processing (Nation, 2013).

Against this background, the present study poses the question: “Is the use of logographic recognition—recognizing words as holistic visual patterns—effective in alphabetic language contexts?” This study aims to explore the theoretical and pedagogical significance of logographic recognition as a complementary approach to phonics-based reading theories, providing a framework that can better accommodate diverse learners.

1-4. Hypothesis

This study hypothesizes that logographic recognition—recognizing words as holistic visual patterns—can also be effective in alphabetic language contexts. This is because even people who cannot read are still able to communicate in English in their daily lives, and thus they can understand content when information is provided through both visual and auditory channels. In countries with low literacy rates, it is highly likely that parents themselves cannot read, so the use of features such as audio read-aloud functions becomes essential. By listening to the audio together with their parents while looking at the pictures, children can understand the story. Furthermore, by adding a function that allows children to listen to every word in the picture book individually and repeatedly, they can connect sounds, written forms, and images at their own pace. This is precisely the type of sound–print mapping that is considered most effective in early literacy development. In fact, NPO EDGE’s audio-based learning tool BEAM also demonstrates the effectiveness of this approach. Using picture books equipped with audio read-aloud functions offers many advantages: parents can use them even if they are illiterate, children naturally develop associations between sounds and written forms, and the method accommodates differences in children’s learning levels. In addition, future development of audio-supported picture books should incorporate interactive features that enhance the depth and flexibility of children’s learning. One promising direction is the implementation of a word-tap function, in which tapping on any word in the picture book triggers audio that provides its pronunciation and meaning. This feature allows children to explore unfamiliar vocabulary independently and supports repeated exposure at their own

pace, which is essential for building sound–print associations. Another useful enhancement is the integration of word-level highlighting that synchronizes with the read-aloud audio. When each word is visually highlighted at the moment it is spoken, children receive a clear, real-time mapping between written forms and spoken language. This can strengthen attention, support decoding, and facilitate the development of early reading fluency. Furthermore, in regions where multiple languages coexist, the development of multilingual audio options will be essential. Providing several language tracks within a single picture book would allow children to listen in their home language while gradually being introduced to the target language, making the tool more adaptable to diverse linguistic environments. This feature is particularly important in low- and middle-income countries, where linguistic diversity is common and educational resources in minority languages are often scarce. Integrating these interactive and multilingual features will not only make audio-supported picture books more engaging but also expand their applicability across different cultural and linguistic contexts. Together, these enhancements can further strengthen the potential of multimodal learning tools to promote inclusive and equitable early literacy development.

2. Research Method

In this study, instead of conducting direct interventions with children, we will utilize existing learning logs and evaluation data collected by non-profit organizations (NPOs) and educational institutions that have implemented audio-supported learning materials. Specifically, data from EDGE's BEAM audio learning program, including detailed learning records and vocabulary assessment results, will be gathered and used as reference material. These datasets provide information on how children interact with audio-enabled books, including variables such as the total time spent on learning, the frequency of repeated listening to individual words, and the progression of vocabulary acquisition over time. The analysis will focus on examining the relationships among these variables. For example, we will investigate whether children who repeatedly listen to individual words demonstrate greater gains in vocabulary recognition compared to those with less frequent repetition. In addition, pre- and post-assessment scores will be analyzed to identify patterns of learning and to estimate the effectiveness of audio-supported materials in promoting the connection between sound, written text, and visual representations. By analyzing large-scale logs and test results, we can assess how exposure to audio-supported picture books contributes to early literacy development, even in contexts where parents may be illiterate or have limited ability to provide direct reading support. Furthermore, this approach allows for the evaluation of the effectiveness of the learning materials across different levels of learners, helping to determine whether the audio-assisted approach can accommodate a wide range of skill levels and individual learning paces. Through this secondary-data analysis, the study aims to provide empirical evidence supporting the hypothesis that logographic recognition, when reinforced with audio-visual materials, can facilitate early literacy acquisition in alphabetic language

contexts without requiring direct intervention with children. This method not only ensures ethical feasibility but also leverages existing resources to generate meaningful insights into the learning process.

3. Results and Discussion

3-1 Results

I referred to research materials on BEAM, an audio learning resource developed by the NPO EDGE. According to the materials, EDGE created a system that can convert textbooks into audio in a short time using speech-synthesis software and the web, and they examined its educational effectiveness. In this experiment, second- and fourth-grade students in regular classrooms, as well as children with developmental dyslexia, were asked to read text-only passages and passages containing both text and audio, and their reading comprehension was compared. The results showed that the effects of audio presentation were particularly pronounced for children with dyslexia, and that even among students in regular classrooms, a certain number showed substantially improved comprehension when audio was provided. Additionally, EDGE distributed CDs containing audio versions of textbook content and conducted a survey before and after use regarding students' motivation to learn, the ease of reading textbooks, and school adjustment. The findings indicated that more frequent use of the audio materials increased learners' motivation, and that this heightened motivation ultimately improved relationships with peers and adaptation to school. This suggests that audio materials may have beneficial effects not only on learning but also on psychological and social aspects. The system used to create the audio materials can be operated without specialized knowledge, requires no special equipment, and is characterized by its low cost and accessibility. Because the rate of CD use varied among households, the materials note that future development must support media formats other than CDs, with forms usable on familiar devices such as smartphones and computers being desirable.

Ultimately, the research confirmed that audio learning materials are effective in supporting reading comprehension and are especially helpful for children who struggle with reading and writing. Looking ahead, wider adoption is anticipated, including applications in subjects other than Japanese, in assigned reading books, in exam materials, and in on-demand systems that allow listeners to adjust playback speed.

3-2 Discussion

The findings from the BEAM research materials offer several important insights for the

present study. First, the strong positive effects of audio-supported learning—particularly for children with developmental dyslexia—support the hypothesis that multimodal input can facilitate early literacy development even in contexts where phonics-based approaches alone may be insufficient. In the BEAM study, children were able to enhance their reading comprehension when text was paired with audio, indicating that the addition of auditory input helped them process and understand written language. This aligns with the premise of the current research: that learning supported by visual and auditory cues can promote word recognition through mechanisms that resemble logographic processing. These results are especially significant for regions with low literacy rates where parents themselves may be unable to read. The BEAM project demonstrates that audio-based tools do not merely compensate for decoding difficulties but also enhance motivation and engagement—factors that are critical for sustained learning in environments where educational support may be limited. The finding that increased use of audio materials improved students' motivation, social adaptation, and relationships with peers suggests that audio-supported resources can influence not only cognitive outcomes but also emotional and social development. This observation echoes the findings of the UBB shared-reading study, which emphasized the role of reading activities in fostering self-regulation and socio-emotional growth. Moreover, the ease of creating audio materials in the BEAM system—requiring no specialized skills or equipment—supports the potential scalability of audio-supported picture books in low- and middle-income settings. Unlike traditional literacy interventions that rely heavily on teacher training or parental literacy, audio-enabled picture books can offer consistent, accessible support for children regardless of their home environment. When children can repeatedly listen to individual words while observing their written forms and illustrations, they begin to establish sound–print–image connections at their own pace. This process closely parallels the way logographic recognition develops in young learners: through repeated exposure to stable visual patterns that gradually acquire meaning. The BEAM findings also highlight the importance of flexibility in the delivery format. Since CD usage varied among households, future tools must be compatible with commonly available devices such as smartphones or low-cost tablets. This is particularly relevant in developing regions, where mobile phones are often more widely accessible than books. The possibility of using mobile-friendly picture books with built-in audio read-aloud functions aligns well with the practical realities of low-literacy households.

Taken together, these findings suggest that multimodal learning materials have the potential to support early literacy development across diverse contexts, including alphabetic languages. While phonics remains an essential component of literacy instruction, the results imply that sound–print mapping supported by visual memory and audio reinforcement may serve as an effective complementary pathway—particularly for learners who struggle with phonological processing or lack access to literacy-rich environments. This has significant implications for literacy education in low- and middle-income countries, particularly for women and girls who may have limited opportunities for formal schooling.

4. Conclusion and Future Prospects

The present research is limited by its reliance on secondary data rather than direct experimentation. Although BEAM provides strong evidence of the benefits of audio-supported learning, its context differs from the settings targeted in this study, and additional research is needed to examine how these findings translate to alphabetic language environments and to communities with very low literacy. Further studies could investigate how children interact with audio-enabled picture books in real-world settings, how parents support learning when they themselves cannot read, and whether logographic-style recognition emerges naturally when children encounter words repeatedly in stable visual forms. Despite these limitations, the BEAM data serve as a compelling reference point, illustrating that multimodal learning materials can meaningfully support literacy development and socio-emotional growth. The results reinforce the hypothesis that logographic recognition, when strengthened through audio-visual integration, may offer an effective and inclusive approach to early literacy instruction—particularly for children living beyond the reach of conventional educational systems.

Looking ahead, several avenues of future research and practical development can be identified. First, empirical studies conducted directly in low- and middle-income countries would provide valuable insight into how audio-supported picture books function in environments where parental literacy is limited and access to educational materials is scarce. Such studies could clarify whether multimodal exposure leads to measurable gains in vocabulary, word recognition, and story comprehension, and whether these gains differ by age, gender, or prior exposure to literacy activities. Second, there is a need to explore technological solutions that can be deployed at scale. Mobile phones—already widespread even in regions with low literacy—represent a promising platform for delivering audio-enabled picture books. Developing lightweight, offline-capable applications that support word-by-word audio playback, variable reading speeds, and simple interactive features could significantly increase accessibility for families without access to traditional learning resources. Third, future research should investigate how sustained exposure to visual word forms and repeated auditory input contributes to the emergence of logographic recognition. Longitudinal observations could reveal whether children begin to recognize frequently encountered words as holistic units, and how this process interacts with later phonological awareness and formal reading instruction. Understanding this developmental trajectory would help clarify how multimodal supports can be integrated with phonics-based approaches rather than positioned as an alternative. Finally, the broader impacts of multimodal learning—such as effects on motivation, parent–child interaction, and socio-emotional development—should continue to be examined. As the BEAM findings suggest, audio-supported learning tools may play an important role not only in cognitive

development but also in fostering confidence, engagement, and a positive relationship with learning. These socio-emotional benefits are particularly relevant for girls and women in low-literacy contexts, where social barriers often limit access to educational opportunities.

In conclusion, the present study highlights the potential of logographic recognition, reinforced through audio-visual learning materials, as a promising and inclusive approach to early literacy development in alphabetic language contexts. By leveraging technology that is accessible, scalable, and independent of parental literacy, this approach offers a practical pathway for supporting children who might otherwise be excluded from foundational literacy experiences. Further empirical research will be essential to refine this framework and to ensure that multimodal literacy interventions can effectively contribute to equitable educational outcomes worldwide.

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Effective use of AI in education field

～How we engage the remote education in next pandemic～

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【論文タイトル】 5205 Iemochi Ono

Abstract （研究の概要）

―――――Recent rapid improve of AI―――――

1. Introduction (Background, Significance, and Purpose)

Today's AI industry continues to develop significantly, and international competition is intensifying, dramatically changing modern society. Therefore, I decided to conduct this research to explore what the AI industry and education in Japan should be like today.

1-1. Social Context (Current Situation and Problems)

Japan's IT industry is lagging behind other IT-advanced countries such as the United States and China due to a lack of human resources and skills.Additionally, IT companies are smaller than Meta, Apple, Google, OpenAI, Tencent, etc., making it difficult to run large-scale projects.

1-2. Previous Research

First, at the launch event for ChatGPT 1.0, developed by OpenAI, it was announced that the number of tokens, which is equivalent to the number of human synapses, has become two-thirds of the human level.
This means that the so-called singularity is fast approaching, and that our society will undergo major changes.
Secondly, in 2024, Masayoshi Son of SoftBank announced that the value of the token will skyrocket every year, and that within 20 years, AI will acquire creativity.

1-3. Research Question (RQ)

How should Japanese industry and education adapt to a rapidly changing society?

1-4. Hypothesis

I believe that it is important to provide literacy education to make AI more familiar to students and to change the curriculum to allow students to choose between humanities and science.

【論文タイトル】 5205 Iemochi Ono

2. Research Method

Use the internet to research the situation of each company and country, and also check documents from relevant ministries and agencies.

3. Results and Discussion

3-1 Results（結果）

In a lecture by an external lecturer from Kawaijuku, it was said that in the future there will be a shortage of over 300,000 humanities graduates and 1 million science graduates.

We must also increase Japan's self-sufficiency in the AI industry by supporting Society 5.0, which is being promoted by the Ministry of Education, Culture, Sports, Science and Technology.

Japan, which lacks necessary resources such as rare metals, needs to quickly recover from the weak yen and it is urgent that it create a strong supply chain.

3-2 Discussion（考察）

The Growing "Human Resources Mismatch" and the Need for Educational Reform

The figures cited in the Kawaijuku lecture—"a shortage of 300,000 liberal arts students and 1 million science students"—are not simply a labor shortage, but a sign that education is not keeping up with changes in the industrial structure.

Until now, Japanese education has divided liberal arts students, who abandon mathematics, from science students who have little interest in social issues, through a "science-or-humanities" system. However, in the age of AI, both "how to use AI (humanities literacy)" and "how to create AI (scientific literacy)" are essential.

Economic Security and Improving "AI Self-Sufficiency"

As Japan struggles with resource shortages and a weak yen, the key to promoting Society 5.0 is "local production and consumption of AI (improving self-sufficiency)," which avoids excessive reliance on foreign-made AI (e.g., GAFAM).

【論文タイトル】 5208 Iemochi Ono

4. Conclusion and Future Prospects

This research has revealed that in order to catch up with Japan's lagging AI industry, a fundamental overhaul of the education system is more urgent than technological development. Cultivating hybrid talent that is not bound by specialization is essential. Creating an environment in which all students see AI as a tool for everyday life, rather than an unknown threat.

These reforms are the key to Japan, which is struggling with a declining birthrate, aging population, and resource shortages, regaining its international competitiveness and realizing a sustainable Society 5.0.

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Closing the education gap in developing countries

～Promoting girl's education～

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Education is widely recognized as a fundamental human right and an essential foundation for social and economic development. Through education, individuals gain knowledge, skills, and opportunities that allow them to improve their quality of life and contribute to society. However, despite global efforts to promote gender equality, many girls around the world are still denied access to education simply because they are female. This issue remains one of the most serious challenges in developing countries.

In recent years, gender inequality in education has also been discussed in developed countries. For example, debates have emerged over differences in educational systems, school admission policies, and access to higher education based on gender. These discussions show that gender equality in education is still an ongoing issue worldwide. However, when we look at developing regions, the situation is far more severe and urgent. In many countries, girls face multiple barriers that prevent them from attending or continuing school.

In developing countries, girls are often expected to prioritize household labor, childcare, or early marriage over education. Cultural norms and traditional gender roles strongly influence parental decisions, leading families to invest more in boys' education than girls'. As a result, many girls drop out of school at an early age or never attend school at all. According to global data, a large number of illiterate people are women, showing how deeply gender inequality in education is rooted.

Limited access to education for women leads to poverty, unemployment, and long-lasting inequality across generations. Women who cannot read or write have fewer job opportunities and lower incomes. Their children are also less likely to receive education, which creates a cycle of poverty that is difficult to escape. Therefore, improving women's access to education is not only an educational issue but also a social, economic, and developmental challenge. This research aims to explore how environments can be created where women in developing countries are able to receive education, even while working to support themselves and their families.

Previous academic research has identified many factors that prevent girls in developing countries from continuing their education. According to Nakamori (2020), there are ten major barriers to girls' secondary education: poverty, educational costs, inadequate school facilities, corporal punishment by teachers, gender-based discrimination at school, low quality of education, lack of female teachers and role models, parental attitudes and social norms, early childbirth, and armed conflict.

These ten barriers are closely connected and often reinforce one another. For example, poverty makes it difficult for families to afford school fees, uniforms, or textbooks. At the same time, social norms may lead parents to believe that educating girls is unnecessary because girls are expected to marry and depend on their husbands in the future. In addition, the lack of female teachers and role models makes it difficult for girls to imagine careers or independent lives supported by education.

In Nakamori's research, these barriers were categorized into four groups: economic factors, school-related factors, girls' awareness, and social factors. In this study, however, these ten barriers are reorganized into two broader categories: socio-cultural barriers and environmental barriers. Socio-cultural barriers include gender discrimination, lack of female role models,

and parental attitudes shaped by social norms. Environmental barriers include poverty, educational costs, poor school facilities, low-quality education, early childbirth, and armed conflict.

Based on this framework, the main research questions of this study are as follows:
How can access to education for women in developing countries be improved?
How can environments be created where women are able to work and continue learning at the same time?

Socio-cultural barriers play a significant role in limiting girls' access to education. In many societies, traditional gender roles prioritize boys' education over girls'. Girls are often expected to help with housework, care for younger siblings, or prepare for marriage. As a result, education is considered less important for girls, especially after primary school. Early marriage and childbirth further interrupt girls' education and make it difficult for them to return to school.

The lack of female teachers and role models is another serious issue. When girls do not see women working as teachers, professionals, or leaders, it becomes harder for them to imagine futures that include education and employment. This lack of representation weakens motivation and reinforces the belief that education is unnecessary for women.

Environmental barriers are equally critical. Poverty forces families to make difficult choices about which children can attend school, and girls are often the first to be excluded. Educational costs such as tuition, uniforms, and transportation create additional burdens. Poor school facilities, overcrowded classrooms, and untrained teachers lower the quality of education and discourage continued attendance.

In regions affected by armed conflict or political instability, regular schooling becomes nearly impossible. Schools may be destroyed, teachers may flee, and safety concerns prevent children from attending classes. These environmental barriers create unstable learning environments that disproportionately affect girls.

Despite these challenges, numerous studies have shown that women's education brings significant social and economic benefits. For example, research indicates that a 1% increase in female secondary school enrollment can raise national income per capita by approximately 0.3%. This demonstrates that investing in women's education contributes directly to economic growth.

Women's education also has a strong impact on health outcomes. Mothers who have completed secondary education tend to have lower infant and child mortality rates than those who have only completed primary education. Educated mothers are more likely to understand basic healthcare, nutrition, and hygiene, which leads to healthier families and communities.

Furthermore, education empowers women by increasing their confidence, decision-making ability, and participation in society. Educated women are more likely to seek employment, engage in community activities, and advocate for their rights. These benefits extend beyond individuals and contribute to national development and social stability.

Several international organizations and initiatives aim to improve access to education for girls in developing countries. One example is Table For Two (TFT), which supports school meals and community development through donations and social campaigns. TFT operates

through three main activities: individual donations, the “Onigiri Action” social media campaign, and systems that reduce food and clothing waste while generating donations for developing countries.

Through these activities, TFT provides support to countries such as Uganda, Rwanda, Tanzania, Kenya, Malawi, and the Philippines. By improving nutrition and economic stability, TFT helps children attend school more regularly and concentrate on learning.

Another major initiative is the World Food Programme (WFP), a United Nations agency that works toward a world without hunger. WFP’s School Feeding Programs encourage school attendance by providing meals at school, take-home food for families, and food vouchers or cash assistance. These programs reduce the economic burden on families and provide strong incentives for sending children, especially girls, to school.

While these initiatives are effective in improving attendance, they mainly target children and do not fully address the needs of adult women who must earn income to support their families. This limitation highlights the need for alternative approaches that combine education with income generation.

Based on these findings, this study proposes a new approach inspired by vocational training institutions in Edo-era Japan, known as *Ninso-Yoriba*. In these facilities, people acquired practical skills and earned stable incomes even if they could not read or write. Drawing from this historical model, this research proposes the establishment of a vocational training institution called “Agency A” in developing countries.

Agency A would have three main characteristics. First, it would accept individuals regardless of age or gender. This inclusive approach ensures that women who missed educational opportunities earlier in life are not excluded. Second, the institution would teach practical skills that match local needs and labor market demand, such as agriculture, sewing, food processing, or craftsmanship. Third, training would be provided through local instructors, dispatched professionals, structured programs, and instructional videos.

Through Agency A, women could acquire job-related skills, secure stable employment, and earn income even without formal academic backgrounds. In addition, this study proposes that workplaces such as factories or training centers provide time after work to teach basic literacy and numeracy skills. This system would allow women to work and learn at the same time, gradually improving their educational level.

By prioritizing stable income while providing learning opportunities, Agency A could help women break the cycle of poverty. Stable income reduces financial pressure and allows women to invest in their own education and their children’s education. Over time, this approach may improve literacy rates and educational access across generations.

However, this model also faces challenges. Identifying appropriate skills, securing funding, and cooperating with governments and NGOs are essential for sustainability. Cultural resistance and traditional gender norms may also limit participation. Addressing these challenges requires careful planning and community involvement.

In conclusion, improving women’s access to education in developing countries requires both economic and socio-cultural solutions. This research argues that vocational training institutions like Agency A offer a practical and effective approach by allowing women to earn

income while continuing to learn. In the future, further research should focus on identifying locally appropriate skills and industries and exploring sustainable ways to operate such institutions in cooperation with governments and NGOs. Ultimately, this approach may contribute to the long-term development of education systems similar to compulsory education models seen in countries like Japan.

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How should developed countries foster rich human resources

~reforming high school education~

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Abstract

This paper explores how advanced countries can reform high school education to nurture "rich human resources" capable of meeting the challenges of modern society. The research focuses on three educational methods: Project-Based Learning (PBL), cultural exchange programs, and volunteer activities. Through a literature review and case study

analysis, the paper finds that these methods are effective in fostering critical thinking, cultural understanding, and social responsibility in students. By adopting these approaches, educational systems can better prepare students for the complexities of a globalized world.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

In the age of globalization and technological advancement, the traditional education system often falls short in preparing students to solve real-world problems. Current methods emphasize rote learning and memorization, which are insufficient for developing essential skills such as critical thinking, creativity, and social responsibility. As society demands a more well-rounded set of skills from individuals, there is a growing need for education systems in advanced countries to adapt.

1-2. Previous Research

Previous research highlights various educational methods aimed at fostering critical thinking and social responsibility. For instance, studies have shown that Project-Based Learning (PBL) enhances problem-solving abilities, while cultural exchange programs foster global citizenship and empathy. However, much of the research has focused on isolated programs, and there remains a gap in understanding how these methods can be integrated into high school curricula to address the challenges of the 21st century.

1-3. Research Question (RQ)

This study addresses the question: How should advanced countries reform high school education to nurture "rich human resources"? Specifically, the paper examines how Project-Based Learning, cultural exchange programs, and volunteer activities can be incorporated into the curriculum to foster critical thinking, cultural understanding, and social responsibility.

1-4. Hypothesis

The hypothesis is that the introduction of Project-Based Learning (PBL), cultural exchange programs, and volunteer activities are effective in nurturing "rich human resources" through high school education. These methods not only encourage academic growth but also develop the social and ethical values necessary to tackle global challenges.

2. Research Method

This research employs a literature review and case study analysis to evaluate the effectiveness of the three proposed educational methods: Project-Based Learning (PBL), cultural exchange programs, and volunteer activities. Reports and studies from both domestic and international educational institutions are analyzed to assess the practical impact of these methods on student development. The analysis focuses on how these methods have been

implemented in various countries and their outcomes in terms of fostering critical thinking, social responsibility, and global awareness.

3. Results and Discussion

3-1 Results（結果）

The literature review and case studies indicate that:

1. **Project-Based Learning (PBL)** has proven effective in enhancing students' problem-solving abilities and critical thinking skills. For example, students working on environmental issues develop solutions through research and collaboration.

2. **Cultural exchange programs** provide students with first-hand experience in diverse cultural settings, which improves their empathy, adaptability, and global awareness. Countries like Finland and Singapore have shown success in using these programs to foster inclusivity and a broader worldview.

3. **Volunteer activities** help students understand their role in society, fostering a sense of social responsibility. Participation in community service programs has been shown to develop ethical values and a cooperative attitude in students.

3-2 Discussion（考察）

The results indicate that integrating PBL, cultural exchange programs, and volunteer activities into high school curricula is an effective way to nurture "rich human resources." These educational methods align with the growing demands of society for individuals who can think critically, understand cultural diversity, and take on social responsibilities. While the results of this study are promising, challenges remain in the implementation of such programs across diverse educational systems. Further research is needed to assess the long-term impact of these methods on students' academic performance and personal development.

4. Conclusion and Future Prospects

In conclusion, advanced countries need to move beyond traditional education methods to prepare students for the complexities of modern society. By incorporating Project-Based Learning (PBL), cultural exchange programs, and volunteer activities into high school curricula, educational systems can foster critical thinking, cultural awareness, and social responsibility. Future research should focus on developing evaluation criteria to measure the long-term impact of these methods. Additionally, schools should tailor these educational approaches to meet the unique needs of their local communities, ensuring that every student

has the opportunity to become a responsible, innovative, and socially-conscious individual.

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Racism in European Football and Future Measures

Why the Problem Continues and How We Can Solve It

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Abstract
This study examines the problem of racism in European football. I looked at the social background, previous studies, and real cases by reading reports and papers from international organizations. The research shows that racism continues even though there are campaigns and rules against it. The results suggest that stronger punishments and long-term education are necessary. In the future, efforts to change the attitudes of fans and clubs will be important.

1. Introduction (Background, Significance, and Purpose)

In European football, racism has been a problem for many years and has had a negative impact on many players and fans. Although UEFA and FIFA have anti-racism campaigns, racist actions still happen during matches and on social media. The purpose of this study is to understand why this problem continues and to consider what solutions might be effective.

1-1. Social Context (Current Situation and Problems)

In recent years, European society has become unstable because of issues related to immigration and cultural diversity. This situation also affects football. Some fans shout racist words or insult players, and many minority players, including Black and Asian players, have suffered. Even though there are campaigns such as “No to Racism,” these incidents continue, so the problem also exists in society as a whole.

1-2. Previous Research

Previous studies say that racism is influenced by historical prejudice, national identity, and group behavior among fans. Cleland (2015) points out that the anonymity of social media increases racist comments. It has also been said that people tend to behave more aggressively in stadiums than in daily life. Another problem is that anti-racism programs are different in each country or league, and some are not effective.

1-3. Research Question (RQ)

Why does racism continue in European football even though there are campaigns and rules? And what measures are effective?

1-4. Hypothesis

This study assumes that racism continues because the current measures focus mainly on punishment and not enough on education. Without changing the attitudes of fans and clubs, racism will not decrease. Based on previous studies, combining strong punishments with long-term education is expected to be the most effective approach.

2. Research Method

This research was conducted mainly through document analysis. I collected data from official reports by UEFA, FIFA, and Kick It Out. Then, I read academic papers on sports sociology and social media to analyze the causes of racism in football. I also compared news articles about racist incidents in the Premier League and Serie A. The information was organized into three categories: types of incidents, responses, and problems.

3. Results and Discussion

3-1 Results

The research found the following points:

1 Racist incidents still happen in many places.
Many cases include insulting chants and racist gestures.

2 Punishments differ by country and league.
Some give heavy penalties such as fines or matches without spectators, while others only give warnings.

3 Educational programs are few and not continuous.
Only a small number of clubs have long-term education programs.

These results show that current campaigns and rules are not effective enough.

3-2 Discussion

The results support the hypothesis that punishment alone is not enough. Even with penalties, racism will not decrease unless fans' attitudes change. Group psychology in stadiums may also cause stronger racist behavior than in daily life.
Looking at examples in other countries, such as the United States, long-term education in schools and communities is helpful. Similar efforts may be effective in Europe as well. New methods, such as using AI systems to detect racist comments on social media, can also be considered.

4. Conclusion and Future Prospects

This study found that a major reason racism continues in European football is the lack of education to change people’s attitudes. As an answer to the research question, combining strong punishments with long-term education seems to be effective. In the future, football associations should unify punishment standards and increase educational programs with local communities. More research on racism on social media is also needed. For football to become a sport everyone can enjoy, both understanding and clear rules are important.

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School counselor collaboration as a support system for children with mental disabilities

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【School counselor collaboration as a support system for children with mental disabilities

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Abstract （研究の概要）
This study examines how collaboration between school counselors and school systems can improve support for children with mental disabilities. The introduction outlines the increasing prevalence of mental health issues among students and the urgent need for institutional support. The research method employs a literature-based comparative analysis of international and domestic studies on school-based mental health systems. The results show recurring patterns of effective collaboration models but also identify systemic barriers such as staffing shortages and inconsistent policy frameworks. The discussion argues that strengthened counselor–school partnerships can meaningfully reduce student stress and promote early intervention. The paper concludes by proposing a multi-tiered support model and suggests directions for policy development and further research.

1. Introduction (Background, Significance, and Purpose)

In my research, one method for making life easier for people with mental disabilities is for school counselors to collaborate with schools. In fact, according to a study by Sweden's Karolinska Institute, the number of children with mental disorders is increasing, making it an era where schools are required to provide appropriate support. Exactly, the number of adults is also increasing today, but I focused on children in this paper.
This study aims to clarify how counselor–school collaboration can improve the school experience and developmental outcomes of students with mental disabilities.

1-1. Social Context (Current Situation and Problems)

Mental health challenges among children have been rising globally, with many school systems reporting higher rates of anxiety disorders, ADHD, depression, and adjustment difficulties. Despite this increase, schools often lack sufficient mental health staff, and teachers frequently feel unprepared to respond to these issues. As a result, students with mental disabilities may face academic disadvantage, social isolation, or delayed diagnosis. This situation highlights the need to strengthen internal support mechanisms within schools, especially through structured collaboration with professional counselors.

1-2. Previous Research

Previous studies have emphasized the importance of early intervention in school environments. Research by Weist (2014) and Hoover et al. (2018) demonstrates that integrating mental health services into schools leads to improved attendance, higher emotional wellbeing, and fewer behavioral incidents. However, other scholars note persistent obstacles: limited funding, unclear role divisions between counselors and teachers, and cultural stigma toward mental illness. While many studies describe the benefits of school-based support, fewer analyses focus specifically on the mechanisms of collaboration between counselors and educational institutions, leaving a gap that this study aims to address.

1-3. Research Question (RQ)

RQ: How does collaboration between school counselors and schools improve support for children with mental disabilities?

This question is important because children with mental disabilities often rely on school environments as their primary social and learning context. Recent data from OECD reports show rising student stress levels and increased demand for structured mental health support in schools, suggesting that the coordination between educational and psychological specialists is more crucial than ever.

1-4. Hypothesis

Hypothesis: Effective collaboration between school counselors and schools enhances early detection, individualized support, and overall wellbeing for children with mental disabilities.

This hypothesis is grounded in previous interdisciplinary studies, which suggest that coordinated communication, shared support plans, and regular case meetings enable schools to respond more quickly and accurately to student needs. Therefore, counselor–school collaboration is expected to function as a protective factor, improving both educational and psychological outcomes.

2. Research Method

This study employed a literature-based comparative research method, focusing on academic articles, international guidelines, and policy reports published between 2010 and 2024. Sources were selected from peer-reviewed journals in psychology, education, and public health.

The analysis proceeded in three stages:

1. Identification of key factors related to counselor–school collaboration.
2. Comparison of international models, including Sweden, Japan, the United States, and Australia.
3. Evaluation of these models in relation to the hypothesis, examining their strengths, weaknesses, and applicability.

Through thematic coding, the study extracted patterns regarding effective collaboration—such as multi-tiered support systems, shared communication protocols, and teacher training—and used these patterns to evaluate the proposed hypothesis.

3. Results and Discussion
Across the reviewed literature, several common findings emerged:

- Studies from Sweden and Australia emphasized the effectiveness of **multi-disciplinary support teams** integrating counselors, psychologists, and teachers.

- U.S. research highlighted that schools with **regular counselor–teacher meetings** showed earlier identification of mental health issues.

- Japanese studies reported **insufficient staffing**, noting that many schools rely on part-time counselors.

- Comparative research showed that **consistent communication protocols** strongly correlated with better student outcomes.

In summary, while most regions recognize the importance of counselor–school collaboration, implementation levels and structural conditions vary significantly.

3-1 Results（結果）

The results suggest that my hypothesis is largely supported: collaboration promotes early intervention and improves student wellbeing. The consistency of findings across multiple countries indicates that shared communication and role clarity are universally important.
However, barriers such as staffing shortages in Japan or policy fragmentation in the U.S. limit effectiveness. This discrepancy may stem from differences in educational policy frameworks, economic resources, or societal attitudes toward mental health.

From a global perspective, the literature suggests a shift toward multi-tiered systems of support (MTSS) and whole-school mental health frameworks, indicating that innovation in this field requires schools to adopt more integrated and preventive approaches.
Thus, it becomes clear that sustainable collaboration must be systemic rather than dependent on individual counselors.

3-2 Discussion（考察）
The results suggest that my hypothesis is largely supported: collaboration promotes early intervention and improves student wellbeing. The consistency of findings across multiple countries indicates that shared communication and role clarity are universally important.
However, barriers such as staffing shortages in Japan or policy fragmentation in the U.S. limit effectiveness. This discrepancy may stem from differences in educational policy frameworks, economic resources, or societal attitudes toward mental health.

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support (MTSS) and whole-school mental health frameworks, indicating that innovation in this field requires schools to adopt more integrated and preventive approaches.
Thus, it becomes clear that sustainable collaboration must be systemic rather than dependent on individual counselors.

4. Conclusion and Future Prospects

This study concludes that structured collaboration between school counselors and schools significantly enhances support for children with mental disabilities. The answer to the research question is that collaboration improves early detection, support consistency, and student wellbeing by combining educational and psychological expertise.

For society, this underscores the importance of investing in school-based mental health infrastructure. Future efforts should focus on increasing counselor availability, creating standardized collaboration protocols, and implementing multi-tiered support systems.

For my own future work, I plan to conduct interviews with school counselors and teachers to gather empirical evidence. Other researchers are encouraged to examine how cultural differences influence collaboration models and explore technology-assisted communication tools for mental health support.

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Lack of teacher in developing country

Utilization of internet to provide education to a lot of people

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Abstract

In Japan, the shortage of teachers is often talked about. When I learned this, I wondered, “What is the situation like in developing countries?” After researching the situation, I found that the world’s average literacy rate is about 70%, but in some developing countries it is only about 15%. Because of this, I decided to study education in developing countries. I made a research question and a hypothesis:

“If we can make a system that allows children to receive enough education at home by using online lessons, it might be a good solution.” As a result of my research, I came up with an idea: instead of using the internet, online lessons can be saved as data on USB drives and given to students. This way, children can learn even if they do not have access to the internet.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

In Japan today, the shortage of teachers is often talked about. I was surprised to hear that, because Japan is a developed country and I thought it had many teachers and put a lot of effort into education. Hearing about this situation, I wondered, “What is it like in developing countries?” If Japan, a developed country, is facing a shortage of teachers, I thought the problem might be even more serious in developing countries. When I actually looked into the situation, I found that the average literacy rate in the world is about 70%, but in some developing countries it is only about 15%. In some of these countries, children cannot even receive basic compulsory education. Also, there are not enough teachers, and the quality of education is often low. Seeing this situation, I decided to study education in developing countries for my research.

1-2. Previous Research

“Education Quality and Governance Challenges in Developing Countries”
by Jingai Mutumbuka, Association for the Development of Education in Africa

“Teachers – A Bridge to the Future of Education in Africa”
by Kponlavi Francisco SEDZRO, Former Minister of Education of Togo

In my research, I read these two papers as previous studies. From them, I learned more about the literacy problem I mentioned earlier. I found that the literacy rate of young people is especially low. I also learned that even though the population is large, there are not enough teachers, and the quality of teachers is low. One reason is that in many developing countries, being a teacher is not seen as a high-status job. Many teachers also work as teachers only as a second job. Some people who could not study well when they were students become teachers because they have no other choice. I felt very sad that a place for learning is treated in such a way.

1-3. Research Question (RQ)

What should we do to give education to people online to solve the lack of education in developing countries?

1-4. Hypothesis

My hypothesis is the use of online classes, as written in my research question. In developing countries, there are few teachers and teacher training is not well developed. So I thought that using online classes could be a good way for a small number of teachers to teach many students. In fact, there is a project called “e-education,” and even in Bangladesh, which was once called the poorest country in the world, many students have passed university entrance exams and are now working in society. From this example, I thought that online classes have great potential. Therefore, if we can create a system that allows students to receive enough education at home through online classes, it could become an effective proposal.

2. Research Method

In this study, I mainly used the internet to research the current situation of education in developing countries, especially the number and quality of teachers and the state of teacher training. Then, based on the problems I found, I made a hypothesis about what kinds of solutions might be effective by looking at previous research. Through this process, I learned about the use of online classes, and I also researched earlier studies that used online classes, as well as the advantages and disadvantages of both face-to-face and online learning.

3. Results and Discussion

3-1 Results（結果）

First, to make a clear proposal, I chose one country to study. This time, I chose the Central African Republic. The reason is that it has the lowest literacy rate in the world. When I checked it, the literacy rate was 38.5%. Since the world average is about 80%, it is very low. When I studied more about the country, I found that the population is increasing every year, but the number of teachers is decreasing. Today, the population is 5.56 million, but there are only 9,756 teachers. I could not find the total number of children, but because 1.8 million children cannot go to school, it is clear that there are not enough teachers, even if we include children who do go to school. Also, the gross enrollment rate in primary school is about 50%, which is about half of the world average. This shows that the educational environment is not well prepared. When I looked for the reasons why children cannot get an education, I found problems such as poor access to schools and a lack of classrooms. So, as I wrote in my hypothesis, I thought the internet might help. But “using the internet” is too vague, so I looked for an example. Then I found “e-education.” It is an activity by a Japanese NPO. They use the internet, online classes, and video lessons to increase the number of students who enter university. They work in countries like Bangladesh and the Philippines, and they choose methods that match each country’s situation.

After learning about this project, I thought of the following plan:

1. Ask trained teachers to make video lessons.
2. Make lessons in many languages, and use automatic translation audio for languages that cannot be covered.
3. Use digital worksheets that students can work on while watching the lessons.
4. Let students go to school three times a week so they can ask questions.

With this plan, we can support the lack of teachers and solve language problems. Also, since learning tools like pencils and erasers are not enough, using digital materials will help students study without them.

3-2 Discussion（考察）

After I reached this conclusion, I read some foreign articles and found many problems. For example, only using video lessons is not very effective. Students also need chances to learn face-to-face from someone. Also, there are very few official teachers, so if we focus only on them, we cannot gather enough people. It may be better to let local young people help students study. The biggest problem I found in the articles was the internet. In developing countries, it is difficult to prepare internet equipment. So I thought it might be good to use USB drives so that students can watch the videos even without internet access. Based on these points, I improved my proposal. The following text is my new proposal. I am planning a project to help children in rural areas of Central Africa learn reading, writing, and basic math, even if they cannot go to school. Many villages do not have enough teachers, and children often stay at home to help their families. To solve this problem, we will use both the internet and offline video lessons so that children can study anywhere. Children can study in a community center, a church, a tutor’s home, or at their own home. All lessons can be used offline, so a stable internet connection is not necessary. Local tutors will support the children. These tutors are not professional teachers. They are young people or adults who have basic reading and math skills. After a short training, they will help with lessons, check children’s progress, and communicate with parents. This system allows children to learn even in places where there are very few teachers. Also, based on what I learned from corporate training, I understood that learning should be fun, not just studying. Therefore, we will design the lessons so that students can enjoy learning. We will also provide an online question support system, but it will only be available during normal school hours. This is because we want to protect students' daily life rhythms and help them maintain healthy habits. The project will use tablets or used smartphones, and solar panels or portable batteries for charging. This will allow children to study safely without needing a school building or constant internet access. Through this project, children can learn at home or in their community and gain the basic skills they need for their future.

4. Conclusion and Future Prospects

My final proposal, based on the results and discussion so far, is as follows.

1. Goal
・To help children in rural Central Africa learn reading, writing, and basic math.

2. Problems
・Very few teachers

・Low literacy rates among young people
・Weak internet access
・Video lessons alone are not effective

3. Offline Learning Materials
・Provide lesson videos using USB drives or stored on devices
・Students can learn without internet
・Can study at home or in local community spaces

4. Local Tutor Training
・Train local young people or adults with a short program
・They learn basic teaching skills
・Tutors support lessons and check student progress

5. Learning Spaces
・Students can learn at home
・Tutor's home

6. Support System
・Online question support is available only during school-like hours
・Helps students maintain healthy daily routines

7. Devices and Power
・Use tablets or used smartphones
・Charge using solar panels or portable batteries

8. Conclusion
・This plan addresses teacher shortages, weak internet, and learning gaps
・Children can learn anywhere
・Helps them build important basic skills for their future

By creating this kind of plan, students can receive lessons even without an internet environment. Also, because tutors are available, students can study not only through online materials but also through real communication. Tutors can teach students how to use the devices, and they can also help solve language problems.
However, there are still some issues, such as whether we can provide devices to all children and whether we can successfully train enough tutors. I tried to research teacher training in the Central African Republic, but there was very little data or information available, so it is difficult to think of clear solutions.

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Waste Mountain's Possibility

~ Project to solve problems in the Philippines using Waste Mountain ~

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Abstract

In the Philippines, there are many waste mountains like the Smoky Valley where people have dumped so much waste as it is. It is the purpose of this research to remove them and to reuse these garbage.Through searching about the way to reuse waste, I focus on "RPF," which is the technology to mix waste and use it as fuel. Recently we can see the current adoption of such technology in some countries.

1. Introduction

1-1. Social Context (Current Situation and Problems)

Today more and more countries are tackling to reduce garbage they throw out to achieve SDGs. However, according to the Global Waste Management Outlook 2024 by the United Nations, the amount of waste generated in 2023 is 2.1 billion tonnes and is predicted to reach 3.8 billion tonnes in 2050. National development is one of the reasons. There are many developing countries around the world. The more their development progresses, the more waste may be generated. So we need to find a new way to progress developing countries without waste generation.

The Philippines, one of the developing countries, also has many problems, and one of that is waste mountains like the Smoky Valley in Payatas. The major way to dispose of garbage in the Philippines is just to dump, not incineration. However, it causes many problems. One of them is "scavengers." These are people who earn a living by picking up garbage and selling it, though waste mountains are too dangerous. For example, harmful gases are emitted from garbage bumps, and they damage people's health. Moreover, scavengers also have a physical risk. In 2000, the waste mountain in Smoky Valley collapsed and more that 200 people became sacrificed.

1-2. Previous Research

The following two studies and case examples were referenced:

①Koji S. and others, Faculty of Economics and Management, Fukushima University [The Millennium Development Goals and International Cooperation in the Philippines: A Fieldwork Practice Report] Firipinn ni okeru mireniamu kaihatsu mokuhyou to kokusai kyouryoku - kaigai firudo waku jissen houkoku - (in Japanese)

Although not a research study, it was referenced as an investigation into the conditions of the "Smoky Mountain" garbage dump, now-closed, and its surrounding area in the Tondo district of Manila City. This report reveals the harsh realities of scavengers' lives, such as "most people living in Tondo can only afford one meal a day."

②Yuri I. and Noritaka K. [Clarifying the Reality of Waste Management in the Philippines and Proposing Waste Policies: A Case Study of Bataan Province] Firipinn ni okeru haikibutsu shori no jittai kaimeii to haikibutsu seisaku no teigenn - batan shu wo jirei to shite (in Japanese)

This proposal highlights challenges in Philippine waste management, including the government's regulations on changing waste disposal methods lacking sufficient effectiveness

and the absence of waste separation.
Based on these findings, proposals include changing the types of waste collected by day of the week, improving employment systems for waste pickers (scavengers), and introducing incineration facilities and environmental education. However, their suggestions are not concrete, like how to improve employment. Moreover the necessity for economic assistance from developed countries is also noted. My study aims to propose more independent solutions with reduced dependency.

1-3. Research Question (RQ)

My research question is "How can we use the waste in the Smoky Valley to solve problems in the Philippines?" As mentioned above, the Philippines needs to remove waste mountains. Of course that is one aim, but my research also aims to find a way to use waste from there for the development of the Philippines. If we find some efficient solutions, we can develop the Philippines in a sustainable way that we don't care too much about waste.

1-4. Hypothesis

Today, in development countries, incineration is the major way to dispose of waste. And we also burn so much fuels in power generation, industry and transportation. And I think we can combine these two incinerations. In other words, we use waste as fuels.

In Japan and other countries, this idea is developed by some companies and governments. One of them is Refuse Paper & Plastic Fuels (RPF). A Japanese company first made RPF and more than 1.5 million tons of RPF were used in Japan in 2023.

My hypothesis for the Research Question is that we use garbage from waste mountains for RPF and use it for development.

2. Research Method

First I searched about RPF in more depth. I found some information about RPF from HP of the Japan RPF Industry Association (JRPF). And I also searched about some concerns, for example past incidents by RPF and some examples in other countries.

Second, I searched past projects of case studies of RPF or other similar fuels in the Philippines. I use the report by JICA and Ogawa Econos in 2017 as a reference.
And last, from this information, I make a concrete proposal.

*RDF, Refuse Derived Fuel, is similar fuel with RPF.

3. Results and Discussion

3-1 Results

First according to JRPF, RPF is a high-quality solid fuel made primarily from industrial waste, such as waste paper and waste plastics, which are difficult to recycle. And compared to coals, its calorific value is the same but costs about three times less. However, there are some accidents caused by RPF in Japan. RPF may spontaneously combust when stored, so we need to care about sorting of waste materials or others.

And I searched about the rules of other countries. I found a study by Yu-Quan Lin and others, which compares RPFs and SRFs in Japan, South Korea, and Taiwan from various angles, including systems, standards, production volumes, and areas of use. In particular, all countries have set strict standards for calorific value, chlorine and so on.

Lastly according to the report by JICA and Ogawa Econos in 2017, there are some *RDF facilities in the dump site in Payatas. This report also said that there are enough demands for RPF. And also from this report, the amount of waste generated across the Philippines as of 2010 was estimated to be 28,750 tons per day, or approximately 10 million tons per year; if the amount removed during sorting and processing is not taken into account, it is possible to produce an equivalent amount of RPF. Given that the price of Australian coal in 2023 will be 24.02 JPY/kg, this will be equivalent to 240 billion yen per year, or $1.5 billion in dollar terms.

3-2 Discussion

From my searching, I found these facts. First RPF is made from waste and could be a substitute for coal but there is a risk of accidents, so care must be taken when handling it. Second, for careful handling, some countries set strict standards for calorific value, chlorine and so on. And at last, there are enough demands and feasibility for RPF in the Philippines. Sorting waste materials is also a good way to handle RPF.

Below are some considerations regarding the introduction of RPF in the Philippines. Its materials are from waste mountains in the Philippines. It can be a solution for removing waste mountains. When dismantling a mountain of garbage to produce raw materials, it is necessary to separate the materials. At this time, we may be able to create jobs as staff to sort the garbage. And the government should set regulations for RPF to prevent accidents. If RPF produced from waste is used in development projects, sustainable development may become possible in the Philippines. Of course, this plan requires a large amount of funding, but I would like the government to cooperate with this plan not only as an "environmental policy" but also as an "industrial policy."

4. Conclusion and Future Prospects

Based on the above, I would like to make the following proposal once again.

First, they will produce RPF using garbage from garbage dumps such as Smoky Valley.

At this time, the labor required for processes such as waste sorting and production will be provided by scavengers and other poor people in the Philippines. The RPF produced in this way will be used as fuel for domestic industries and other sectors. The Philippine government will carry out the above initiatives as a national project, positioning them not only as "environmental policy" but also as "industrial policy."

Of course there are still some problems such as how to change people's common sense about waste disposal or which countries provide RPF technology and how. I will continue to

develop solutions to these challenges.

Finally, I would like to mention one more point about the significance of realizing this proposal in the Philippines. If the RPF project succeeds in the Philippines, it is reasonable to expect that similar projects could eventually be implemented in other developing countries. While the aforementioned JICA study also focused on the Philippines, the fact that the Philippines—a country burdened by the negative symbol of the “garbage mountain”—could become a model case for development projects using RPF carries significance beyond mere waste utilization or national development projects.

Considering these various benefits, I propose RPF fuel conversion and the associated job creation, along with domestic development utilizing RPF, as a solution to the Philippines' challenges by utilizing the waste from Smoky Valley.

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World Wide Security by Geopolitics
~Utilize Balance of Power~

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Abstract

This study proposes establishing a regional international organization utilizing the discipline known as “geopolitics.” By improving the security environment of the international region, it aims to maintain the fundamental principle of war avoidance—the balance of power—and construct a security environment premised on avoiding war.

1. Introduction (Background, Significance, Purpose)

1-1 Social Trends (Current Situation and Problems)

In modern society, security issues are one of the most important problems for every country, regardless of their level of development.
For example:

- On February 24, 2022, Russia invaded Ukraine.
- On August 26, 2024, a Chinese Air Force reconnaissance plane violated Japanese airspace.
- On October 7, 2023, Hamas carried out a cross-border attack on Israel, and Israel responded by bombing the Palestinian territories along the Mediterranean coast.

Currently, the regions where the security environment is especially worsening are the Middle East, Asia, and Eastern Europe.
In the Middle East, the conflict between Israel and Hamas continues, and religious issues remain unresolved. In Eastern Europe, countries that were part of the former Soviet Union are concerned about security because of Russia's invasion of Ukraine. These countries include the Baltic states (Estonia, Latvia, Lithuania), Belarus, Ukraine, and Moldova.
In Asia, China has been expanding its military power since the 2000s. Using funds from ODA from countries like Japan (which built airports and highways that could be used as military facilities in emergencies), China increased its defense budget 39 times from 1992 to 2022. There have also been incidents where Chinese patrol boats attacked Indonesian fishing boats, increasing tensions in Asia.
The Korean Peninsula, geopolitically very important, is still in a tense situation with the war continuing.
For people living in conflict regions worldwide, improving the security environment is essential.

1-2 Previous Research

Geopolitics began as a field of study in the late 19th and early 20th centuries. However, its roots can be seen in ancient Greece with thinkers like Herodotus and Plato.
The German Empire, located between Imperial Russia and France, began serious research to improve its security environment. Researchers like List, Triechke, and Humboldt studied political geography.
In 1899, Rudolf Kjellén from Sweden proposed the term "geopolitics." Later, Friedrich Ratzel proposed the "organic state theory," and Karl Haushofer developed continental-state geopolitics in Germany. Halford Mackinder and Alfred Mahan established sea-power-based geopolitics theories.
During World War II, geopolitics was used as the academic basis for expansion policies of Nazi Germany and the Empire of Japan. After the war, it was avoided due to its association with imperialism, but the U.S. studied geopolitics during the Cold War. Today, it is gaining attention again, including in civilian research.
Geopolitics was originally developed to help settle conflicts between nations, and it retains this nature today.
Based on this, global-scale security environment construction is considered difficult, so this study focuses on Asia. It examined historical regional international organizations, such as the Greater East Asia Co-Prosperity Sphere of the Empire of Japan and the current ASEAN.

Both organizations share features: region, purpose, cultural exchange, and direction of external pressure. Both aimed to unite countries in Asia to address external pressures. Cultural exchange is especially important because human thought and action are influenced by regional culture.

1-3 Research Question

The research question is:
"How can a geopolitics-based international organization be established to improve the security environment of countries and reduce war or armed conflict?"
Modern weapons are much more advanced than in past wars. MBTs (Main Battle Tanks), high-mobility vehicles, strategic bombers like the B-2, and nuclear weapons can cause rapid destruction. Poor supply lines can also cause troops to loot, harming civilians, as seen in World War II with German units.
Therefore, improving the security environment is crucial for all countries, advanced or developing, and urgent action is needed.

1-4 Hypothesis

This study focuses on Asia. If the study included the whole world, it would be too broad and shallow. The research proposes creating a new regional international organization called "AGEA" (Asian Geo-Economic Alliance). Important questions include which countries to include.
The study considers sea-power (control and use of the seas) and land-power (use of land) nations. Land-power nations like Russia, Germany, and China tend to expand territory, while sea-power nations like Japan, the U.S., and the U.K. focus on protecting and expanding interests. Sea-power nations rarely fight each other, but when they do, it can be catastrophic, like in the Pacific War.
Based on this, the conditions for membership are:

1. Asian countries
2. Capitalist countries
3. Sea-power countries

Eligible countries are Japan, South Korea, Taiwan, the Philippines, Indonesia, Malaysia, Papua New Guinea, Australia, and New Zealand. The U.S. is included as an observer.
These countries are expected to have strong influence due to strategic resources like oil, steel, and semiconductors. For example, they control about 5% of global oil, or 86,695,000 barrels per year, enough for one Aegis ship to operate for 439 years.

2. Research Methods

This study uses the following research methods to examine the possibility that creating a regional international organization, AGEA (Asian Geo-Economic Alliance), can improve the security environment.
Literature Review and Comparative Analysis
First, a literature review on existing regional international organizations is conducted. The focus is on ASEAN and the Greater East Asia Co-Prosperity Sphere. This review analyzes how these organizations were created, their purposes, structures, and results. Official documents from the Ministry of Foreign Affairs and academic papers, such as Takashi Yamazaki's *“Environment”* and *“100 Years of Geopolitics”*, are used to understand the historical background and modern significance of regional organizations.
Next, geopolitics books, such as Kaldor's *“New Wars”* and Spykman’s *“Geopolitics of Peace”*, are carefully studied to analyze the role of geopolitics in modern security. Using insights from these sources, AGEA is compared with existing regional organizations to evaluate its uniqueness and potential effects.

Spatial Analysis Using GIS
To visualize AGEA's geopolitical significance, spatial analysis using Geographic Information Systems (GIS) is conducted. Open-source software like QGIS is used to create maps showing:

- Geographic distribution of potential AGEA member countries
- Spatial patterns of economic indicators (GDP, trade volume, etc.)
- Production centers and distribution routes of key strategic materials (oil, steel, semiconductors)

These maps show AGEA's geographic coverage and economic potential, and they help analyze its strategic importance from a geopolitical perspective.

Scenario Analysis
To predict AGEA's impact on regional security, three scenarios are considered:

1. AGEA is established, and cooperation among member countries is strong
2. AGEA is partially successful, but some countries do not join
3. AGEA fails to be established, and the existing regional order remains

For each scenario, strategic theories from Zbigniew Brzezinski (*"The Grand Chessboard"*) and Keegan (*"The Logic of Neo-Conservatives"*) are used to analyze geopolitical effects. Factors such as military balance, economic cooperation, and diplomatic relations are considered to evaluate the likelihood and impact of each scenario.

Simulation of Strategic Materials Distribution
To measure AGEA's economic effects quantitatively, computer simulations are used to study the distribution of strategic materials (oil, steel, semiconductors). The simulation analyzes changes before and after AGEA is established, including:

- Changes in the flow of strategic materials among member countries
- Changes in the flow to non-member countries
- Changes in the prices of strategic materials
-

Hypothesis Testing and Analysis
The data and insights from the above methods are integrated to test the research hypothesis, focusing on:

- AGEA's impact on regional bipolar relations
- Security improvements through managing strategic material distribution
- The correlation between economic unity among member countries and the prevention of armed conflicts

The results are combined to evaluate AGEA's potential effects on regional security from multiple perspectives. Modern geopolitics theories, such as Mearsheimer's *"The Tragedy of Great Power Politics"* and Kaplan's *"Geopolitics of Asia"*, are used to critically examine the validity and limits of the hypothesis.
Through these research methods, this study systematically investigates the possibility of improving the security environment by establishing AGEA, clarifying its feasibility and potential impact.

3. Research Results and Discussion

This study proposed the establishment of a regional international organization, AGEA (Asian Geo-Economic Alliance), to improve the security environment in Asia. The results and discussion are as follows.
Methods of Verification and Challenges
The study identified several challenges for establishing AGEA:

1. Coordination among member countries
   Member countries have different economic and political backgrounds, making it difficult to set common goals and build a cooperative framework.

2. Relations with non-member countries
   Conflicts with land-power countries such as China and Russia could increase. At the same time, economic interdependence with non-member countries is important.
3. Management and distribution of strategic materials
   There is a risk of strategic materials, such as oil, steel, and semiconductors, being diverted during emergencies. A system for managing these resources is necessary.

Solutions to these challenges are suggested based on previous studies and original analysis.

Results of Verification and Analysis

1. Strengthening cooperation among member countries
   Nine countries were selected as AGEA members, including Japan, South Korea, Taiwan, and the Philippines. These are sea-power nations capable of forming a cooperative security framework. Implementing common currency or trade incentives within the economic zone could strengthen economic unity and build trust among members.
2. Relations with non-member countries
   The United States is expected to participate as an observer to check the influence of China and Russia. To reduce the risk of conflict with China, economic interdependence and dialogue channels with non-member countries are important.
3. Management of strategic materials
   AGEA members hold more than 5% of world oil production, over 10% of steel production, and significant semiconductor production capacity. Unified management systems and export regulations are necessary to prevent resource leaks during emergencies.

Discussion

The results suggest that establishing AGEA can clarify bipolar relationships in Asia and potentially improve the security environment. Managing strategic materials strengthens economic unity among members and may reduce the risk of armed conflict. This aligns with geopolitical theories such as Rimland Theory by Spykman and Mackinder.

A new finding is the impact on the semiconductor industry. Semiconductors are critical for modern warfare, and improving production capacity enhances the competitiveness of all member countries. Technological innovation in this sector could also contribute to regional stability.

Lessons from ASEAN show that gradual integration and flexibility are key to success. AGEA should adopt a similar phased approach to build cooperation.

4. Conclusion and Future Outlook

This study explored the possibility that AGEA could improve Asia's security environment and reduce conflicts. The conclusions are:

1. AGEA could improve security and clarify bipolar relationships
   The organization includes Japan, South Korea, Taiwan, the Philippines, Indonesia, Malaysia, Papua New Guinea, Australia, and New Zealand as members, with the U.S. as an observer. These are sea-power nations with capitalist economies.
2. Strategic importance lies in resource management
   Members control 5% of global oil, over 10% of steel, and significant semiconductor capacity. Joint management strengthens economic unity and increases negotiation power with non-member countries. Cooperation in semiconductors promotes innovation and global competitiveness.
3. Potential benefits and risks
   AGEA could reduce the risk of armed conflict and maintain a balance of power in Asia. At the same time, cooperation among sea-power nations could provoke conflicts with land-power nations, so careful diplomacy is needed.
4. Challenges and recommendations
   - Coordination among members requires careful diplomacy.
   - Relations with China and Russia must be managed strategically.
   - Unified management of strategic materials, currency coordination, and trade incentives are essential.

    - Gradual integration and cultural exchange programs can strengthen long-term cooperation.
5. Future research and steps
    - Detailed design of AGEA's organization and decision-making processes.
    - Policies for economic cooperation and strategic material management.
    - Diplomatic strategies for non-member countries.
    - Legal alignment with international law and existing organizations.
    - Development of indicators to measure improvements in the security environment.

The establishment of AGEA has great potential to improve Asia's security environment, reduce conflicts, and promote regional prosperity. Careful, long-term, and strategic efforts are needed to realize this vision.

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Sustainable Stage Arts

～What Theater Can Do for a Sustainable World～

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Abstract

This research focuses on the issue of large-scare waste of stage sets, and aims to develop a sustainable system for creation and operation in the stage arts.

As for the research methods, I analyzed previous studies and international cases, particularly Scotland's "Re-Set Scenery", and examined data on material waste and CO_2 emissions.

The results suggest that introducing a four-stage cyclical system (standardization of stage sets, centralized material management, rental services, and material disassembly/reuse) can reduce waste while maintaining economic efficiency.

In the future, I want to aim to realize sustainable stage arts worldwide by constructing a model case at the national level (for example, in Japan) and achieving a balance between artistic creativity, cost efficiency, and environmental responsibility.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

Stage arts are loved all over the world, for example, musicals, opera, theater and so on. In these performances, the creators and the audience share the same time and space, and feel moved together. Because of this, stage arts help people grow emotionally and are essential for humans to live meaningful lives.

However, many materials are used in stage productions, and a large amount is thrown away after the stage ends. It is said that one stage can create enough waste to fill one or two 4-ton trucks. In the theatre industry, people often think that using things once and throwing them away is the most efficient and cost effective way, especially when trying to express ideas freely.

But today, as we see from the SDGs, society is expected to become more sustainable. I believe we must solve these problems that stage arts are facing.

1-2. Previous Research

Re-Set Scenery is a non-profit organization founded in Scotland in 2017 by Simon Cook and Matt Doolan, who had worked in the creative industries. Their goal is to make the entertainment industry more circular. Today, the group is run by three staff members.

They operate a warehouse in Glasgow and rent out stage sets and materials for events and performances. They are undertaking these initiatives.

・Selling and renting stage sets：Buying or renting reused sets is about 45% cheaper than making new ones. All sets are stored in the warehouse, and users can check the inventory online.

・Collecting sets after events：They help clean up venues and collect materials that can still be reused.

・Disassembling materials for reuse： When certain items can no longer be used, they take them apart and collect as many reusable parts as possible.

・Training young artists： They teach small communities and school groups basic skills such as tool use, construction, and stage basics.
・Measuring carbon emissions： They calculate how much CO_2 is produced by existing sets and support more sustainable material choices.

This system currently exists only in Scotland. If similar systems were created around the world, it could greatly reduce waste in the stage arts.

1-3. Research Question (RQ)

"How can we reduce stage set waste in world theater effectively?"

Solving this problem could help reduce a large amount of waste in the stage industry. This connects to SDGs goals 11 and 12.

According to the Japanese Ministry of the Environment (2018), the construction industry is the third-largest producer of waste. Buildings are meant to last many years, but temporary constructions such as booths and stage sets for events and performances are used for a very short time and then thrown away. This shows that the performing arts face a serious sustainability issue.

1-4. Hypothesis

Creating a global system that allows stage sets to be reused in many performances will greatly reduce the amount of stage waste.

Right now, reusing sets is difficult because many sets are made specifically for one stage, making them hard to use in other performances. This creates a linear system in which materials are simply thrown away. In addition, designed sets have copyrights, which make reuse even more difficult.

If these issues can be solved, I believe reuse will become possible.

2. Research Method

In this research, I used the following methods
Collected information from academic papers, websites, news articles, and official reports.
Compared previous studies related to waste reduction and circular systems.
Examined examples such as Re-Set Scenery to understand effective systems.
Calculated approximate amounts of waste and CO_2 emissions in the stage industry.
Analyzed how each method could support or challenge my hypothesis.

I organized the findings to evaluate whether a reuse system could be realistic and effective.

3. Results and Discussion

3-1 Results

From the literature review and case studies, I found these things.
・A large amount of stage waste is produced worldwide, often equal to 1–2 truckloads per

production.
・Re-Set Scenery shows that reuse is possible, and can reduce cost by about 45%.
・Many materials can be reused if properly disassembled, showing the potential for a circular system.
・Copyright and non-standard design are major barriers to worldwide reuse.
・Training and education programs help spread sustainable practices.
Previous studies differed
・Some focused on cost reduction.
・Others emphasized environmental impact.
・A few highlighted artistic freedom and safety issues.

These differences show that sustainability in performing arts is a complex issue with many viewpoints.

3-2 Discussion

The results suggest several important ideas.A reuse system can reduce waste, as shown by Re-Set Scenery. However, global standardization is difficult because every country has different artistic traditions, costs, and legal structures. Artistic freedom may be reduced if the system becomes too strict. Safety is also a major concern. Any reused set must be strong enough and not dangerous for performers. From an innovation perspective, modular design, standard sizing, and shared databases could make reuse easier. International cooperation or national-level systems such as starting with Japan may be more realistic than a single global system. Overall, the research supports the hypothesis, but only if the system is introduced with flexibility and gradual improvement.

4. Conclusion and Future Prospects

In this study, I focused on sustainability in the stage arts, a topic that has not been discussed deeply until now. To reduce waste, I propose creating a reuse cycle for stage sets, inspired by Re-Set Scenery. The cycle includes about four initiatives.
・Standardizing sizes, colors, and materials
・Managing materials in warehouses with digital databases
・Renting materials at lower cost
・Disassembling sets after performances for reuse
Instead of one global system, it is more effective to build systems by region or by country. However, several concerns remain
・Who decides the standards?
・Where should warehouses be located?
・Can the system avoid financial losses?
・Will artistic freedom be harmed?
・Will different productions start looking too similar?
Therefore, I believe the best approach is to start with one country, such as Japan, to test and improve the system. Then, successful examples can be shared globally. Sustainability and artistic creativity can coexist if we begin with a small percentage of reusable sets and

gradually increase it. In the long term, the system must meet three conditions: reduced waste, maintained artistic quality, and reasonable cost.
From now on, I want to continue researching this topic more deeply and work toward making this proposal achievable.

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Educational support for South Africa

～To Continue Developing Only in That Country~

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【Educational support for South Africa】 5215Shiraishi Daigo

Abstract

I suggest ways for people to create and use the new education system by themselves. I researched on the internet and interviews. As a result, it is a good solution to dispatch teachers. I want to make a teacher dispatch system to raise local teachers. Future prospects are thinking about support for dispatched people. There are a lot of differences in their culture, food, and weather. Moreover, it is important to think about how we dispatch teachers and how long we dispatch.

1. Introduction

Now, most Japanese people receive compulsory education. Moreover, the proportion of other advanced countries' receive compulsory education is 100% because they have made the way of education. However, in Africa region and developing countries, the proportion of school enrollment rate is low and there are a lot of children that feel nervous about their future. Especially in the Africa region, children are forced to work and they cannot receive education because they cannot go to school. Recently, the Africa region began to develop education systems such as built schools and so on. That's why advanced countries have to think about what we can do for children in South Africa.

1-1. Social Context

We can read and write so we cannot understand people who cannot read and write. It is the same that people who cannot read and write cannot understand what is read and write. People who live in advanced countries should fill this gap. If we have a lot of gaps, we cannot work together and be corporate. It will be hard to develop in the world. First, we should make a situation that everyone can read and write, and it will start to develop.

1-2. Previous Research

In South Africa, the youth unemployment rate is very high, so strengthening Technical and Vocational Education and Training (TVET) is an important issue. Although the government recognizes the importance of vocational education, many problems still remain.

Therefore, support from developed countries plays a big role. For example, Germany, other European countries, and Australia cooperate with South African technical schools to improve the quality of vocational training. One example is the introduction of Germany's dual system, which combines classroom learning with practical work. This system helps students gain skills that can be used immediately in the workplace.

Another serious problem in South Africa's education system is the lack of professional skills among teachers, especially in poor areas. To solve this problem, teacher training programs from countries such as the United States and Canada, as well as international NGOs, are provided. These programs improve teaching methods and focus on special needs education and multicultural education, which are important in South Africa's diverse society. In addition, support for using ICT in education helps teachers use digital tools and online learning effectively. By improving teachers' skills, students' academic performance and the overall quality of education are expected to improve.

1-3. Research Question

To solve education problems fundamentally, a country must eventually run its education system by itself. If a country continues to depend on support from other countries, it will become difficult both financially and in terms of human resources. Therefore, I want to consider a teacher dispatch system that helps establish an education system which can be operated by the country itself.

My research question is: What kind of teacher dispatch system is effective as a starting point for creating a sustainable, self-managed education program in the Republic of South Africa?

1-4. Hypothesis

One hypothesis is that expanding existing teacher dispatch systems will bring the best results in both efficiency and effectiveness. If support comes from only one country, the burden will be too heavy, so it is better to share the responsibility internationally. If the dispatch of teachers from developed countries becomes a cycle, it will be a system with many benefits for both the sending countries and the receiving country.However, it is also important to consider support for dispatched teachers. They have to live in different places, environments, and food cultures from their home country, so support systems and assistance from their home countries are necessary.

2. Research Method

I will collect information using the internet and compare information from many different websites. I will also use academic paper search sites to refer to previous studies and carefully select useful information while using generative AI. In addition, I would like to interview teachers and read books in order to learn about real voices from the field.

3. Results and Discussion

3-1 Results

Currently, discussions about introducing the dual system are progressing in Africa. The aims of this system are to improve quality, gain trust from employers, and increase the attractiveness of vocational education. In fact, it is already being used for students in the electrical industry. This system helps young people acquire vocational skills more easily and is expected to reduce youth unemployment.In addition, this program is being developed in cooperation with the German government, so it is expected to grow into a larger project in the future. Although there are still many challenges, the system is likely to improve over time.

3-2 Discussion

As a result of this research and as a starting point for creating an education system, a teacher dispatch system is considered effective. In particular, the dual system that South Africa uses in cooperation with European countries is good. This system allows people to study and receive teacher training at the same time, helping them become effective workers more quickly.This system should be promoted mainly through the dispatch of educators from developed countries. These teachers should be able to speak languages such as English, French, Spanish, Arabic, and Dutch. While the sending countries should cover the main costs, support from other countries should also be increased to reduce the burden on each country.Through this system, local future teachers can work with highly skilled educators and improve their abilities. By focusing on training local people first, South Africa will eventually be able to develop human resources on its own and create education programs that better fit its local needs.

4. Conclusion and Future Prospects

In conclusion, teacher dispatch programs should first be carried out by countries whose teachers can speak South Africa's official languages in order to support education there. These teachers will work with local people to discuss what kind of education system South Africa should build in the future. They will also teach students and future teachers communication skills, teaching methods, and ways to develop people.The costs should be covered by the sending countries and small contributions from companies and organizations in developed countries. If education in Africa improves, it will help create a better global balance and a more active world.One future challenge is support for dispatched teachers. Because the environment and food are very different, support for daily life will be important. Details such as the length and location of dispatch still need to be considered.

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Improve the problem of loss flower

～How to prevebt becoming loss flower～

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Abstract （研究の概要）

The problem of flower loss is less well-known than food loss,but this problem is serious ,too.Recently,the amount of flower loss is increasing by COVID-19In fact, from the influence of COVID-19 a variety of ceremonies are decreasing.
In fact I think the number of loss flowers are increasing.

1. Introduction (Background, Significance, and Purpose)

I think flowers are an important part of important Japanese culture in Japan. So,I want to

spread more.

1-1. Social Context (Current Situation and Problems)
Flower waste has become a significant environmental and economic issue as large amounts of unsold or discarded flowers end up in landfills. These wastes contribute to greenhouse gas emissions and require high energy inputs throughout production, transportation, and disposal. Despite this impact, public awareness and recycling systems for flower waste remain limited. Addressing this problem is essential for creating a more sustainable floral industry and reducing unnecessary resource loss.

1-2. Previous Research

Previous studies have explored how researchers have addressed issues related to flower waste, revealing problems such as inefficient disposal, limited recycling systems, and low public awareness. Despite these findings, many challenges remain unsolved, including the lack of standardized management methods and insufficient long-term environmental data. Based on these gaps, the aim of my research is to identify practical strategies that can reduce flower waste and promote more sustainable use of floral products. By focusing on solutions that could be applied in everyday settings, this study seeks to contribute to more effective and environmentally responsible flower-waste management.

1-3. Research Question (RQ)
How to prevent becoming loss flowers before.
1-4. Hypothesis
Predict the amount required

【論文タイトル】 5135 Suzuki-3
2. Research Method

By searching papers on the internet.

3. Results and Discussion

3-1 Results（結果）

Through reading some papers, several studies emphasized that flower loss often occurs due to overproduction and inaccurate demand forecasting. Research also showed that regions with effective prediction systems or data-based supply management reported lower waste levels. Some studies high technological approaches, such as AI-based demand prediction or improved logistics, while others focused on consumer behavior and market timing. I think that each study offered different strategies, most agreed that improving demand accuracy is essential for reducing flower waste.

3-2 Discussion（考察）

These findings suggest that my hypothesis predicting the required amount can help prevent flower loss was supported by similar research. Many studies indicated that inaccurate demand forecasting is one of the main causes of waste, which aligns with the Research Question. The differences among studies, such as whether to focus on technology or sales patterns, may reflect variations in regional markets and industry scale. From an international perspective, countries using data-driven forecasting systems show significantly lower waste, suggesting that Japan could benefit from adopting similar innovations. Therefore, developing a more accurate prediction method or integrating digital tools into the flower supply chain could be a promising approach to reducing flower loss.

4. Conclusion and Future Prospects

From this research, I learned that flower waste can be reduced by predicting how many flowers are really needed. Many studies showed that waste happens when producers grow too many flowers or cannot guess the demand correctly. Therefore, the best way to reduce flower loss is to improve demand prediction and adjust production based on the data.

And, I find some way to recycle the flowers.I want to spread this way with predicting ways.

In the future, I want to find simple and practical ways that flower shops or markets in Japan can use to predict demand more accurately. Other researchers can also study how technology or consumer behavior can help make flower use more sustainable.

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Governance system for space utilization

～between developing and developed countries

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Abstract （研究の概要）
Many developed countries release space debris owing to dangerous experiences. My conclusion is a system between developed countries and developing countries. Developed one teaches their technology to the other. We have to work on the problem as soon as possible.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems

The principal actors in space development were primarily the **United States and the Soviet Union, led by national initiatives** during the Cold War era. Rocket development and manned spaceflight, often an extension of military technology, symbolized national prestige and the competition between the two systems. Due to the rivalry between the two blocs, international organizations that struggled to reach consensus were limited in their role. However, after the Cold War, as cooperation increased and the immense financial burden of space development became difficult for a single nation to bear, frameworks for cooperation involving multiple nations and international organizations, such as the **International Space Station (ISS)**, emerged. Entering the 21st century, the participation of private companies accelerated, driven by technological innovation and cost reduction. Companies like the US-based **SpaceX and Blue Origin** have grown to handle transportation and exploration. While the state still retains a central role in security and regulation, the actual development and operation have shifted to a **public-private partnership model.** This transformation is underpinned by factors such as the **end of the Cold War structure, the economization of space activities, and the growing demand for global problem-solving** (e.g., Earth observation, communication, resource utilization).

1-2. Previous Research

The current framework of international space law is based on the Outer Space Treaty of 1967, along with the UN space treaties (the Rescue Agreement, the Liability Convention, and the Moon Agreement). These treaties set forth fundamental principles such as **"the use of outer space for the benefit of all mankind," "non-appropriation,"** and **"state responsibility."** The UN Committee on the Peaceful Uses of Outer Space (COPUOS) has complementarily formulated guidelines and recommendations. However, a major challenge is the lack of binding force due to the **absence of a coercive enforcement mechanism** and the **abstract nature of the treaty provisions.** Furthermore, because these treaties were established during the Cold War, they are **insufficient to address contemporary issues** such as commercial resource utilization and space debris mitigation. In fact, the Moon Agreement has not been ratified by major spacefaring nations, leading to its gradual obsolescence. Meanwhile, new governance attempts are emerging, such as the US-led **Artemis Accords** and national space resource utilization regulations enacted by individual countries. Moving

forward, it is an urgent task to create international rules that balance cooperation among nations with private sector activities to ensure the sustainable use of outer space.

1-3. Research Question (RQ)

What is the ultimate system for space utilization relative to space debris?

Beyond the treaties, **soft law** instruments, such as the **Space Debris Mitigation Guidelines** and the **Guidelines for the Long-term Sustainability of Outer Space Activities (LTS Guidelines)**, have been developed by **COPUOS** (UN Committee on the Peaceful Uses of Outer Space). However, compliance with these guidelines varies significantly among states and private entities.

Furthermore, while the concepts of **removal and monitoring** are easily discussed, they entail **vast costs with little prospect of revenue generation**, meaning there is no clear expectation that such measures will be widely adopted without further action. Therefore, it can be argued that the current framework has **limited effectiveness** in fundamentally resolving the space debris problem. We need a new system to realize the safety space.

1-4. Hypothesis

To promote **prevention**, it would be effective to clearly establish the **locus of responsibility** for space debris. If nations or operators know that they are accountable for the debris they create, irresponsible behavior will naturally be discouraged.

Regarding **removal/reduction**, emerging and developing nations should take the lead in creating a **Space Debris Reduction Guideline** to urge advanced spacefaring nations, which have historically polluted outer space, to adopt concrete measures for debris reduction. Prior to creating any Space Debris Reduction Guideline, the **definition of space debris** should be clearly re-established, even if it is within a non-legally binding international soft law instrument. More detailed explanations are required, similar to how the **JAXA Space Debris Prevention Standard** defines the scope of application for debris removal targets as applying to debris that "could interfere with **Earth orbit (especially the Low Earth Orbit (LEO) protected zone and Geostationary Orbit (GEO) protected zone), Moon orbit, Mars orbit, stable Earth-Moon Lagrange points, and stable Sun-Earth Lagrange points.**"

・My hypothesis

I propose assigning a percentage of the responsibility for debris cleanup to each nation, based on the **total mass of space debris they have historically contributed.** The government of each nation would then be entrusted with deciding whether to mandate cleanup from private companies/operators or handle the remediation efforts as a state-level operation. This mechanism would naturally incentivize governments to push their operators to reduce space debris, making the issue impossible for operators to ignore.

The main challenge, as expected, is **gaining the consensus of advanced spacefaring nations.** However, as noted in the issue briefing, the irresponsible actions of advanced nations like China and the United States cannot be ignored, and it is unreasonable for emerging nations to be left to clean up their mess. As a leader for the emerging and developing world, the **UAE** must take a firm stance on this issue.

On the other hand, space debris remediation is one area of the space industry where the small number of advanced nations are often **reluctant to invest.** As an alternative option, entering this field could serve as an **entry point for developing nations to break into the space industry** itself. Naturally, since the **responsibility for the existing debris rests with the advanced nations**, the **technology and the associated costs** for this remediation work must be **fully borne by the advanced nations.**

2. Research Method

First, I randomly selected countries without bias regarding region, religion, and technological capability. To tell the truth, I didn't know which country is the most developed, hence I had AI select randomly and I researched their technological capability.

Second, I collect data to support my hypothesis. I use the home page which is trustworthy of the Japanese Ministry of Foreign Affairs.

Third, I formulate a system plan. I was careful not to disadvantage either developed or developing countries.

Also when I researched the United Nations, I decided to define the setting of my hypothesis.

3. Results and Discussion

3-1 Results（結果）

・Selecting countries

the US, Rossian Federation, France, the UK, Switzerland, China, Japan, India, UAE, Korea, Canada, Republic of Korea, Iran, Israel, Portugal, Philippines, Ethiopia, Argentina, Vietnam, Kenya, Iran, Chile, Indonesia, Nigeria, Saudi Arabia, Colombia, Pakistan.

・The setting of my hypothesis

80th Session of the United Nations General Assembly
Special Political and Decolonization Committee (Fourth Committee)

・International organizations and conferences dealing with space issues.

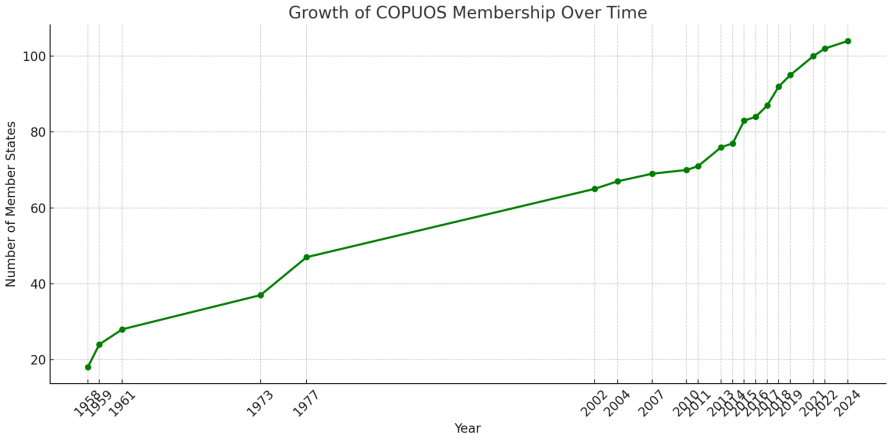
○The UN

The UN General Assembly (UNGA) has adopted relevant treaties and UN resolutions that serve as important norms as humanity expands its space activities. Furthermore, the UN General Assembly has annually adopted a resolution titled "**International cooperation in the peaceful uses of outer space**" since 1994. In addition to evaluating discussions and initiatives related to space activities both within and outside the UN and calling for the participation of member states, the resolution also **promotes capacity building** aimed at assisting the participation of developing countries in space activities.

○COPUOS

The involvement of countries without independent launch capabilities in the field of space

development is increasing. The United Nations Committee on the Peaceful Uses of Outer Space (**COPUOS**), which initially comprised only 18 member states upon its establishment in 1958, has seen its membership grow year by year. With the addition of Djibouti and Latvia in 2024, it is currently composed of **104 member states**.



The graph above illustrates the trend in the number of COPUOS participating countries, and it clearly shows a rapid surge in membership, especially since the start of the 21st century.

○UNOOSA

The **United Nations Office for Outer Space Affairs (UNOOSA)** is a secretariat based in Vienna. It is mandated to **promote international cooperation in the peaceful uses of outer space** and to **assist developing countries in utilizing space technology for development**. UNOOSA also handles the overall administration of UN space policy, including the registration and indexing of UN space objects, acting as the secretariat for COPUOS and space-related inter-agency meetings of the UN, and managing associated international bodies. One of the bodies managed by UNOOSA is the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER), which was established to enable countries and regional organizations to use space-based information and services for disaster management.

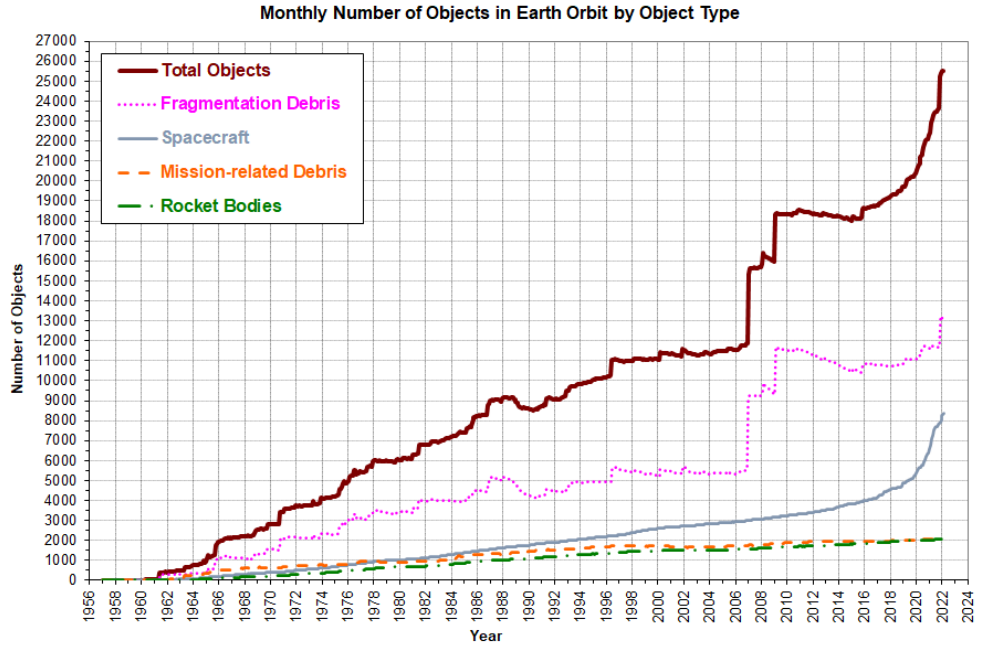
UNOOSA has contributed to the dissemination of space technology applications in developing countries. Central to this effort is the **United Nations Programme on Space Applications (PSA)**, which has been implemented since 1971. The PSA has organized numerous workshops and seminars to assist developing countries in applying space technology to natural resource management, communications, and disaster management. Furthermore, to cultivate personnel with expertise in space technology in various countries, **Regional Centres** have been established in six locations worldwide with the objective of improving the skills and knowledge of scientists and researchers.

○Others

Countries engaged in space activities often establish agencies to plan and execute their national space utilization policies and research activities. Representative examples include the **Japan Aerospace Exploration Agency (JAXA)** and the **National Aeronautics and Space Administration (NASA)** of the United States. In addition to these national space agencies, there are also instances where countries belonging to the same region have established international space organizations to jointly advance space policy.

A prime example of a regional space agency is the **European Space Agency (ESA)**. ESA was established in 1975 as a platform for European countries to cooperate in order to catch up with the two major powers, the United States and the Soviet Union. Following a successful rocket launch in 1979, Europe gained the ability to execute its own independent space utilization policy. As stated in its founding convention, ESA restricts its activities to "**exclusively peaceful purposes**," engaging in international cooperation focused on the utilization of space as social infrastructure, such as the development of rockets and operational satellites, rather than military use.

Another characteristic of ESA is the **"optional participation system,"** which allows member states to declare their participation or non-participation in each project. This enables countries that wish to take the lead and have their domestic companies play a central role to actively provide substantial funding. Conversely, even countries with minimal space technology can participate in a part of a project by offering a certain amount of funding, making it an opportunity for technological development. In this way, ESA ensures maximum freedom for its member states while enabling cooperation within the European region, serving as a major driving force for the advancement of European space development.



・Space Utilization Treaties

Name	Year	Number of participate
Outer Space Treaty	1967	116
Rescue Agreement	1968	100
Liability Convention	1972	100
Registration Convention	1976	76
Moon Agreement	1984	17

Below picture is a hole made by space debris. The damage gave a serious impact to utilization.

〇What are Space Debris?

Space debris refers to the man-made objects left in Earth orbit as a result of human space activities. While broadly referred to as "space debris," the types vary widely. Space debris includes large objects, such as spent rocket bodies and satellites that have completed their operational lifespan, as well as smaller items, such as released bolts and nuts or fragments generated from the explosion of space objects. It also encompasses extremely tiny particles, such as flecks of paint or soot from rockets. Although a unified interpretation of space debris can be found in the space debris mitigation guidelines discussed later, an internationally unified definition for space debris does not exist, as it is not defined in the Outer Space Treaty.

3-2 Discussion（考察）

〇My System

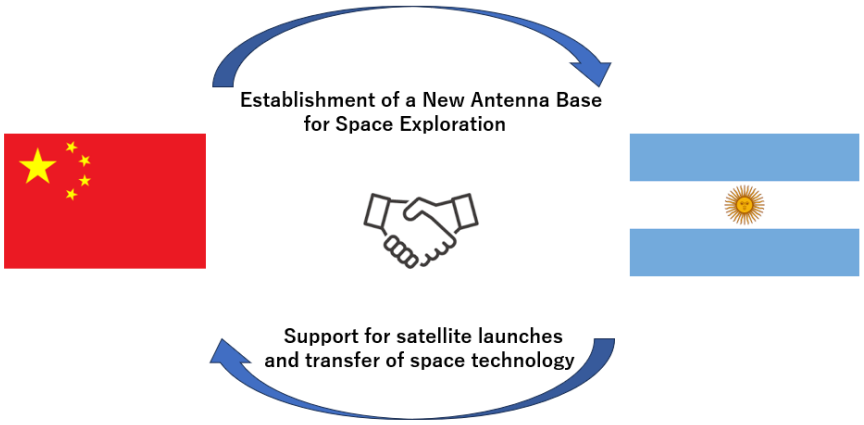
1. The developed countries support the other for satellite launches and transfer of space technology.

2. The developing countries lease national land in exchange for the support.

3. Supported countries learn and get technologies of space utilization.

4. After a few years, they gather the space debris.

The below picture shows us the relationship between China and Argentina. It is based on fact.



4. Conclusion and Future Prospects

Since Article II of the Outer Space Treaty (OST) prohibits the national appropriation of outer space, the domain belongs to no single state. Precisely because outer space is a realm belonging to no specific state—a domain "for all humankind"—its exploration and use are considered matters that should be carried out "for the benefit of all countries."

However, it is also a fact that the use of space requires vast economic power and advanced technological capability, meaning many nations, particularly developing countries, lack the means to utilize space. In reality, the "Artemis Program," one of the current multinational governance frameworks for space development, includes only a limited number of countries, primarily those advanced in space technology. Consequently, concerns are being raised that the interests of "all countries" are not being protected, primarily due to worries about the widening gap in resources, technology, and information.

Broadly, two main methods can be considered to ensure the interests of states that cannot utilize space for economic or technological reasons:

First, the transfer of space utilization capability: States possessing the ability to utilize space can assist in enhancing the space utilization capabilities of other countries. Article I of the Outer Space Treaty guarantees the freedom of exploration and use for states, stating that "Outer space... shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law." Furthermore, UN

General Assembly Resolution 1962 (XVIII) (Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space), which forms the basis of the OST, stipulated that the use of space should be "for the benefit of all mankind." Since this resolution was adopted unanimously, this concept is considered an internationally established principle in space utilization.

Due to this principle, the need for assistance to improve access to outer space, particularly for developing countries, has been asserted. Specific examples include the transfer of space utilization technology, the sharing of information, and the execution of joint space missions. However, it must be noted that, as confirmed in this text, space utilization technology is closely tied to national security, and achieving a usable level requires significant time and massive technical and financial support.

Second, the direct provision of benefits derived from space utilization through international cooperation. Specifically, this includes the provision of satellite positioning system services, such as GPS, or the sharing of satellite observation data. The Remote Sensing Principles adopted in 1986 stipulate adherence to the principles outlined in Article I of the Outer Space Treaty and the need for due regard for the rights and interests of other states. While there are several phrases promoting technical and international assistance to developing countries that cannot directly participate in remote sensing, the Principles do not mandate the direct provision of data and information. It is also worth noting that forms of assistance that combine both the enhancement of space utilization capability and the provision of benefits, such as the sale of satellites or launch services, are also conceivable.

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The world's energy problem

～Focus on solar power generation～

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Research Overview (Abstract)

As the finiteness of resources such as fossil fuels becomes a growing concern, renewable energy is attracting attention as an alternative to conventional power generation methods such as thermal and nuclear power. Then, what can be done globally as policies to increase the adoption of renewable energy?

1. Introduction (Research Background, Significance, and Purpose)

1-1 Social Trends (Current Situation and Problems)

The global energy issues can be broadly divided into the following seven categories.

1. Dependence on Fossil Fuels and the Resulting Global Warming and Climate Change

Background:
Oil… about 50 years, coal… about 130 years, natural gas… about 49 years (estimated remaining reserves)

2. Delay in the Spread of Renewable Energy

Causes:
Due to technological limitations, high initial investment, and issues such as power generation efficiency.

3. Uneven Distribution of Energy

Background:

- Developing countries → insufficient energy supply, limited access to energy
- Developed countries → excessive energy consumption

4. Fluctuations in Energy Prices

Background:
Market prices of fossil fuels fluctuate due to international political conditions and supply balance.
Impact:
Significant effects on politics and the economy (※ severe damage to impoverished populations)

5. Aging and Insufficient Energy Infrastructure

Background:

- Developing countries → lack and aging of infrastructure, unstable energy supply
- Emerging countries → rapid urbanization and population growth leading to rapidly increasing energy demand

6. Energy Security Issues

Background:
Energy supply sources around the world rely heavily on a limited number of countries.
Impact:
Political tensions and international relations greatly influence the security of energy supply.

7. Safety of Nuclear Power and the Issue of Radioactive Waste

Background:
Fukushima Daiichi Nuclear Power Plant accident
Impact:
As long as the issues of reactor shutdowns and radioactive waste disposal remain unsolved, expanding the use of nuclear power will be difficult.

1–2 Previous Studies 1

Current global efforts addressing the seven issues mentioned above

1. Measures against dependence on fossil fuels and global warming
・Paris Agreement (2015)
《Overview》An international framework for climate change measures signed by more than 195 countries
Sets targets for reducing greenhouse gas emissions (obligates each country to voluntarily work on reduction)
・Promotion of decarbonization
《Japan》By 2030: Reduce greenhouse gas emissions by 46%
By 2050: “Carbon Neutrality” (focus on expanding renewable energy and building a hydrogen-based society)
《European Union (EU)》Aiming to achieve carbon neutrality by 2050 under the “Green Deal”
(e.g., strengthening of the Emissions Trading System, EU ETS)

2. Expansion of renewable energy
・Investment in renewable energy
《World》Large-scale investments in renewable energy
EX) Solar power generation is rapidly growing in the Middle East, Africa, and Asia
《China》Holds the world’s largest solar power installation (accelerating renewable energy

development domestically and abroad)
・Innovation in power grids
《Europe & the United States》Experimentation with smart grid technology (efficiently managing the balance of supply and demand)
→ Enables efficient distribution of energy

3. Reducing inequality in energy access
・Energy access improvement programs
《International Organizations》
① World Bank and UNDP → Expanding decentralized power supply in developing countries
EX) Rural areas in Africa and Asia → Introduction of small-scale solar power and biomass power generation
② African Energy Access Program → Collaboration between the African Union (AU) and international organizations
EX) Introduction of solar mini-grids utilizing renewable energy

4. Response to energy price fluctuations
・Stabilization of energy prices
《International Organizations》OPEC (Organization of the Petroleum Exporting Countries) → Adjusts oil supply

→ Prevents damage from sharp rises in oil prices
・Diversification of energy markets

《Purpose》To reduce dependence on energy sources other than fossil fuels
To expand renewable energy and improve the stability of the electricity market

5. Improvement of energy efficiency
・Dissemination of energy-saving technologies
《World》LED lighting, high-efficiency home appliances, electric vehicles (EVs)
→ Contributes to reducing energy consumption and CO_2 emissions

6. Strengthening energy security
・Improvement of energy self-sufficiency
EX) Expansion of renewable energy
《Impacts》① Significant reduction in import costs ② Cleaner energy
③ Revitalization of developing industries ④ Preparedness for external supply risks (disasters, conflicts, price spikes)

7. Safety of nuclear power generation and waste issues
・Strengthening nuclear safety
Introduction of safety standards and monitoring systems
Development of next-generation nuclear technologies such as High-Temperature Gas-cooled Reactors (HTGR) and Small Modular Reactors (SMR)
・Technological development for waste disposal

Review of radioactive waste treatment methods (construction of deep geological disposal facilities)

1–3 Research Question

“What methods can be used to reduce conventional depletable energy sources and increase renewable energy?”

1–4 Hypothesis

Each country needs to promote the spread of renewable energy through its own policies and strategies, while the entire world cooperates—centered on international organizations such as the United Nations.

2. Research Methods

① Investigate each country’s policies using the websites of their Ministries of the Environment and similar institutions.
② Consider policies that can create a win-win relationship between countries.

3. Results and Discussion

《United States》Inflation Reduction Act;
Strengthening investment in smart grids and energy storage facilities
《Europe (EU)》Renewable Energy Directive (RED II); establishment of the Innovation Fund
Offshore wind power installations in the North Sea and Baltic Sea
《China》Promotion of electric vehicles (EVs); strengthening grid connections
《Japan》FIT (Feed-in Tariff) system and FIP (Feed-in Premium) system
Establishment of renewable energy special zones; promotion of offshore wind power
《India》National Solar Mission; establishment of the International Solar Alliance (ISA)
Installation of small-scale solar power systems in rural areas
《Developing Countries》Funding from the Green Climate Fund (GCF)

4. Conclusion and Future Prospects

Based on the policies and strategies of each country, I would like to propose my own ideas for international cooperation programs that make use of each country’s climate and

geographical advantages.
EX) Utilizing the desert areas in central Australia as installation sites for solar panels from multiple countries.

NASA, JAXA, ESA, Roscosmos, and other national space agencies cooperate to conduct solar power generation in outer space.

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How can we improve our non-cognitive ability?

~For our future life~

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Abstract

Non-cognitive ability that can't be scored by the paper test is the most important for our gloomy society.I researched many activities to nurture non-cognitive ability and listed up the problem of them.Then, I came to think that card games may be the most important role in improving children's non-cognitive ability.

1. Introduction

These days, many people are facing global problems such as global warming , religious conflict , abnormal weather and so forth. Some of the experts say it is an unpredictable society!According to their article, these problems are complex and conventional education cannot nurture a person who handles it , so they proposed that our education should focus on the non-cognitive ability. This is an ability that is difficult to score unlike cognitive ability such as leadership or memory. I think to solve these problems, non-cognitive ability is an essential element**.**

1-1. Social Context

Non-cognitive ability is said to be the effective ability for global problems .If many young people completely gain the ability , it is likely to help them solve problems.

1-2. Previous Research

A wide range of international studies has examined how non-cognitive abilities—such as self-regulation, persistence, empathy, and cooperation—can be strengthened through targeted environmental and educational practices. Research on executive functions shows that structured routines and guided practice can improve inhibition, working memory, and cognitive flexibility, especially during childhood (Diamond, 2013; Zelazo & Carlson, 2012). Social-emotional learning (SEL) programs have also been found to enhance empathy, emotional regulation, and interpersonal skills, with meta-analyses confirming significant improvements in students' social competence and behavioral outcomes (Durlak et al., 2011).

Moreover, studies indicate that supportive teacher–student relationships contribute to higher levels of self-regulation and motivation, particularly in early schooling (Pianta, 1999). Growth-mindset interventions have similarly been shown to increase persistence and academic resilience by shaping students' beliefs about learning (Dweck, 2006).

1-3. Research Question (RQ)

My research question is "How can we improve our non-cognitive ability?".In my previous research, many authors don't know what the best way to improve their ability is because the concept of non-cognitive has been emerging lately.

1-4. Hypothesis

This study hypothesizes that regular participation in structured card-game activities will improve children's non-cognitive skills, particularly inhibitory control, cognitive flexibility, and cooperative behavior. This expectation is based on prior research showing that rule-based games support executive function development (Diamond, 2013) and that card and board games enhance planning, working memory, and social interaction (Dias et al., 2015; van der Meijden & Veenman, 2019). Therefore, the provisional answer to the research question is that card games can serve as an effective tool for fostering key non-cognitive abilities.

How can we improve our non-cognitive ability? 5219 Takahshi-3

2. Research Method

First I focused on what is non–cognitive ability and how to create it by some articles online.Second, I focused on the previous activities about non cognitive abilities.Third, I looked up the activities that use card games and compared them with the previous one. In order to search papers, I used " research buddy".

3. Results and Discussion

3-1 Results

In the randomized controlled trial conducted by Moya-Higueras et al. (2023), 68 children aged 7–12 were assigned to play modern board and card games that were designed either to directly activate executive functions or to activate other cognitive domains. Across both groups, significant time effects were observed for cognitive flexibility and inhibitory control after the intervention period, indicating improvements in these core executive functions following gameplay. Working memory showed a smaller but still positive effect .

The study further reported that all games used in the intervention significantly activated basic executive functions—inhibition, flexibility, and updating—regardless of the experimental condition. This suggests that engaging with modern board and card games, irrespective of the intended cognitive focus, was associated with measurable gains in key non-cognitive domains among participants.

Additionally, a recent family-based intervention study found that five weeks of card game training produced significant increases in both inhibitory control and cognitive flexibility in

preschool children. These gains were maintained at follow-up, and overall executive functioning improvements became significant for the family card game group, indicating transfer effects beyond the game context.

Finally, in a supplementary classroom observation conducted for a study , students who engaged in weekly card-game activities demonstrated higher levels of turn-taking behavior and shorter conflict-resolution times compared with the baseline recorded one month earlier. Quantitatively, cooperative turn-taking increased from an average of 3.1 instances per session to 5.4 instances, and unresolved conflicts decreased from 7 cases to 3 cases after the intervention period.

3-2 Discussion

The results suggest that card games can serve as an effective medium for enhancing non-cognitive skills, particularly those related to executive function and cooperative behavior. These findings align with the initial research question, which proposed that structured gameplay environments could stimulate self-regulation, communication, and problem-solving abilities. The improvements observed in inhibitory control and cognitive flexibility are consistent with theories of cognitive load and rule-based learning, which posit that repeated engagement with structured tasks strengthens executive processes.

Differences among the reviewed studies—such as whether rule-based or negotiation-oriented games are more beneficial—may be attributable to variations in participant age, cultural context, and game format.For example,younger children may respond more strongly to clear, rule-heavy games, whereas older learners may benefit more from negotiation- and communication-centered tasks.

The cross-cultural findings are particularly noteworthy from a global perspective. The fact that card-game interventions demonstrated positive effects across multiple countries suggests that these activities tap into universal social-cognitive processes. This insight supports the idea that card games could be positioned as low-cost, scalable tools for educational innovation worldwide. Furthermore, from an innovation standpoint, integrating analog card games with digital feedback systems or collaborative learning platforms may further enhance their educational utility, enabling the assessment and reinforcement of non-cognitive skills in real time.

Overall, the results support the hypothesis that card games offer an accessible and versatile approach to cultivating non-cognitive abilities. They also highlight the importance of selecting game types that match developmental needs and cultural contexts.

4. Conclusion and Future Prospects

This study concludes that card games can effectively support the development of non-cognitive skills, especially executive functions and cooperative behaviors. Based on the reviewed literature and observational data, structured gameplay environments appear to promote self-regulation, social communication, and flexible thinking. In response to the research question, the current findings indicate that card games represent a meaningful educational tool that complements traditional academic instruction by providing interactive, low-cost opportunities for skill development.

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Promoting E-Book Adoption to Increase Reading Time

What are the best ways to increase reading time with e-books?

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Abstract

This study examines how reading time in Japan can be increased by encouraging the use of e-books. Many young people today do not read regularly, and this has become a social problem. To address this issue, I propose a system called *"Twin Read,"* which lets readers get both a paper book and an e-book with one purchase. By reviewing statistics, previous studies, and examples of digital innovation, this research shows that digital reading is not the same as paper reading. The results suggest that reaching non-readers and offering flexible reading choices can help people spend more time reading.

1. Introduction

1-1. Social Context

Although millions of books exist today, reading habits in Japan are decreasing every year. A 2022 study by Benesse and the University of Tokyo reported that **49% of students read zero minutes on weekdays**. Among adults in their 20s, almost half do not read even one book a month. One major reason is the increasing use of social media, which shortens people's attention spans. Reading may help solve this problem because it trains people to focus and understand more complex ideas.

1-2. Previous Research

Many earlier studies treated e-books and paper books as almost the same. However, recent international research, such as the Norwegian study by Spjeldnæs and Karlsen, shows that digital reading is a different activity. It is often more social, less focused, and more connected to online behavior. This means that e-books cannot simply "replace" paper books, and a more careful approach is needed.

1-3. Research Question

What are the best ways to increase reading time with e-books?

I selected this question because many people in Japan know about e-books, but only a few actually use them. By understanding how e-books can support people who currently do not read much, we can create new ways to encourage reading.

1-4. Hypothesis

My hypothesis is that **non-readers are more likely to start reading if e-books are easier to access**, and that **a system combining paper and digital books will increase overall reading time**.

2. Research Method

This study used the following methods:

- Analysis of reading statistics from Japanese publishers and education institutes
- Review of international research on digital reading habits
- Study of innovation ideas, especially examples from the Singapore Chinese Cultural Centre (SCCC)
- Creation of the *Twin Read* system as a practical proposal based on these findings

3. Results and Discussion

3-1. Results

Key findings include:

- **49% of students** in Japan do not read on weekdays (Benesse & University of Tokyo).
- Only **44% of men** and **48% of women** in their 20s read at least one book per month (honto).
- In 2013, **56.8% of people had used e-books**, but **only 6.2% had paid for them** (MMD Research Institute).
- Among e-book users, **43.2% read at least one book per month**, showing strong potential.
- The Norwegian study showed that digital reading is more social and less immersive than paper reading.

3-2. Discussion

These results support the idea that e-books can increase reading time, especially for non-readers. However, e-books should not be viewed as simple replacements for paper books because their reading style and cultural meaning are different.

Inspired by the SCCC, I developed the *Twin Read* system. If both paper and digital versions

are sold together at **1.3 times the price of a regular book**, both industries (printing and

digital) can benefit. This reduces competition and promotes cooperation. It also respects the cultural value of paper books while making digital reading more accessible.

4. Conclusion and Future Prospects

This research shows that a hybrid approach combining tradition and technology is necessary to increase reading time in Japan. The *Twin Read* system provides a realistic solution by giving readers more choices.

Future steps include:

- Promoting the advantages of e-books to non-readers
- Creating special digital-only features to make e-books more appealing

Building a strong reading culture in the digital age will require cooperation between publishers, technology companies, and educators.

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Compatibility with high quality education and the difference

～achieve the motivation to learning～

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【Compatibility with high quality education and the difference】 5221Hagiwara-2

Abstract

Now I am researching educational disparities in developing countries. I could learn about educational disparities are very serious and their parents don't have a good image and understanding about education. So the children can not go to school. Then I thought that I want to increase the number of places where they can learn to study or language.Then I found TERAKOYA. It is a place where everyone can study or learn and produced by UNESCO.
I decided to become TERAKOYA which anyone can join and which aims to boost literacy rates more accessible to children in developing countries.

1-1. Social Context (Current Situation and Problems)

Last year, I researched work-style reforms for teachers in Japan. Now, Japan is making new plans to improve teachers' working conditions. When I studied the "teacher shortage," which is one reason these reforms are needed, I found an article that explained how this shortage affects students. In schools, there is a "cycle of impact": "Teacher shortage → More new graduates hired → More inexperienced teachers → More low-quality lessons → SDGs 4: Quality Education for All cannot be achieved." I used Japan as an example, but these problems happen not only in Japan. They happen in many countries around the world. For example, we often hear about educational problems in developing countries, but they also occur in developed countries. Teacher shortages, low-quality lessons, and educational inequality are connected problems. In the United States, some families have many children, so parents need to earn more money to send all of them to school. Because of this, parents often have heavy workloads and cannot spend enough time supporting their children's education. For these reasons, I want to continue researching how to solve educational inequality not only in developing countries but also in the whole world.

1-2. Previous Research

According to a 2021 paper by Mr. Shigeaki Ito of the Asian Development Institute, there are four important points for improving the quality of learning: (1) teachers' skills and effort, (2) school facilities and learning materials, (3) good school management, and (4) students' readiness for learning. Points (1)–(3) are on the supply side, meaning people who provide education, and point (4) is on the demand side, meaning students who receive education. The paper says that children from richer families are more likely to go to school. To increase school enrollment, governments have made policies like giving financial support, free school meals, and conditional cash transfer programs, where families receive money if their children attend school. Before the SDGs, the MDGs, which ended in 2015, also focused

on school attendance as the goal. Policies like those mentioned earlier led to increased enrollment rates in many countries. Yet, it became clear that in many cases, children were attending school without learning much of substance. While primary school enrollment rates rose in low-income countries, it was found that many students graduated unable to read, write, or do basic arithmetic, or dropped out before completing their education.

1-3. Research Question (RQ)

What is the domestic problem of progressing education difference and lack of high quality education.

1-4. Hypothesis

As hypotheses for the research question, it is possible that developing countries do not have many places outside school where children can learn easily, and that family income is low or parents do not fully understand the importance of education. Also, Gary Becker's "Human Capital Theory" says that "people are like capital, and investing in them will bring returns." In the same way, education is an investment in children, helping them gain human capital such as knowledge and skills. When children receive enough education, their abilities and productivity grow. This leads to higher income in the future and also helps them get the jobs they want. Therefore, it is thought that the household reason for the lack of high-quality education and the growing educational gap is related to low family income.

2. Research Method

Using the study by the National Institute for Educational Policy Research, "Relationship between home income, family environment, and children's academic achievement from an international comparison," this research looks at what disadvantages children face in education depending on their family income level and the quality of their school.

3-1 Results

The ranking of countries which low annual income.The most low is South Sudan 246dollar, the second loe is Brunge 339dollar, third low is Maraui 342dollar, fourth low is Central Africa 425dollar, fifth low is Yemen 449dollar.

I researched that international data and showed a clear relationship between education and income.According to an analysis by the IMF, more than 50% of the increase in world income per person from 1980 to 2019 can be explained by the rise in education levels. It also says that education helped raise the income of the poorest 20% of people by about 60–70%.In low-income countries, education levels are rising, but this does not always lead to higher income.For example, in Bangladesh, Malawi, and Uganda, the average years of schooling increased, but the income level did not reach that of developed countries. This may be because education is not strongly connected to the job market or industries in these countries.UNICEF also reports that in many low- and middle-income countries, public education spending often benefits richer families more. Because of this, children in poor families cannot get enough educational chances, and the education gap becomes wider.Furthermore, a joint study by UNICEF, the World Bank, and UNESCO shows that about 70% of 10-year-old children in low- and middle-income countries cannot read or do basic math. This “learning poverty” can have a negative effect on their future income.

3-2 Discussion

These results show that education is very important for increasing people’s income. However, in some low-income countries, higher education levels do not always lead to higher income. This suggests that education alone is not enough. If the job market or industries are not developed, people cannot use the skills they learned in school. Because of this, education does not always bring better economic results. The UNICEF report also shows that public education spending often goes to richer families, which means children from poor families cannot get enough chances to learn. As a result, the gap between rich and poor becomes wider, creating a cycle where children who cannot study well now have fewer chances to get good jobs in the future. In addition, the fact that about 70% of 10-year-old children cannot read or do basic math shows a serious problem. Without basic skills, it is difficult for them to continue learning or get better-paying jobs later in life. From these points, it is clear that improving education alone is not enough. Countries also need better job systems, stronger industries, and fairer distribution of resources to reduce educational and economic inequality.

4. Conclusion and Future Prospects

In conclusion, the domestic problem of progressing education difference and the lack of high-quality education comes mainly from economic gaps, low access to learning materials, and unfair distribution of educational support. Many children in poor families cannot receive enough learning opportunities, and this creates a cycle where poverty and low education continue into the next generation. To solve this problem, spreading the World Terakoya Movement can be a very effective idea. The Terakoya program gives basic reading, writing, and math education to people who cannot easily go to school. It also helps communities learn together and support each other. If more countries and local areas join this movement, children and adults will have more chances to learn, even in poor environments. This conclusion is important for society because improving basic education can reduce poverty, increase job opportunities, and create a more equal and peaceful world. When more people can read, think, and make decisions, they can build stronger communities and a better future. Therefore, expanding the Terakoya Movement can be a strong way to reduce educational inequality around the world.

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Making the world a better place through the power of Art therapy

~For those with mental illness~

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Abstract （研究の概要）

1. Introduction (Background, Significance, and Purpose)

I like art, so I wanted to research and consider art last year. And more, I was interested about psychotherapy. So I researched art therapy and learned about mental health care in Western countries. And I was surprised about that, art therapy also for dementia prevention.
I want to help people who are suffering from mental illness, so it will be a better way to save those people. But, nowadays a lot of country art therapy is not common therapy to take care of mental illness.

1-1. Social Context (Current Situation and Problems)

Nowadays people in many countries have mental illnesses, so I want to help those people and give some effect to a lot of people to live more healthy. Many mental illnesses go to the hospital and get some medicine and help with their lives. So it has a good effect and also give bad effect because many mental illnesses depend on that medicine. So I want to change that situation and improve their lives more comfortably.

1-2. Previous Research

Some recherther recherch about art therapy. So, I used it as a reference.

1-3. Research Question (RQ)

Can the power of art improve healthcare worldwide?

Could spreading art therapy globally enhance current medical practices and even help prevent dementia in the elderly?

1-4. Hypothesis

①To spread it worldwide, it would be good for art therapy to become adaptable to various situations.
Because some countries require licensure for art therapy, while others do not.
Consequently, there is a significant disparity between countries where art therapy is utilized and those where it is not.

②Depending on the status of obtaining art therapy licenses, art therapy might become more mainstream worldwide.

2. Research Method

Active Visual Art Therapy and Health Outcomes～A Systematic Review and Meta-Analysis ～

Ronja Joschko, Caroline Klatte, Weronika A. Grabowska, Stephanie Roll, Anne Berghöfer, Stefan N. Willich

• Key Points I Learned:

1. Previously, I conducted all artistic activities as art therapy, but this paper focuses specifically on visual arts (such as painting and drawing) for research.

I meta-analyzed approaches that have been suggested to be effective and presented small to moderate effects as statistical effect sizes.

It demonstrates that engaging in meaningful interaction with an art therapist is crucial, rather than merely drawing pictures.

3. Results and Discussion

3-1 Results（結果）

Previous studies show that active visual art therapy has positive effects on mental health outcomes such as depression, anxiety, and emotional well-being.

According to Joschko et al. (2024), small to moderate positive effect sizes were observed across multiple studies, indicating that visual art therapy can contribute to improved psychological health.

In addition, the research emphasized that the effectiveness of art therapy increases when participants interact meaningfully with a trained art therapist, rather than engaging in art-making alone.

Some studies also suggest that art therapy may support cognitive function in older adults, which implies potential benefits for dementia prevention.

However, the availability and use of art therapy differ greatly by country.

In some Western countries, art therapy is recognized as a professional healthcare practice requiring formal licensure, while in other countries it is not widely used or institutionally supported.

3-2 Discussion（考察）

The results suggest that art therapy has the potential to improve mental healthcare, supporting the research question of whether art can enhance healthcare worldwide.

The findings align with the hypothesis that art therapy is more effective when it is

professionally structured and supported.
The emphasis on interaction with licensed art therapists indicates that professional training and certification play an important role in maximizing therapeutic outcomes.

Differences between countries may be explained by variations in medical systems, cultural attitudes toward mental health, and the presence or absence of official licensing systems.
In countries where art therapy is institutionalized, it is more likely to be integrated into healthcare and preventive care, including dementia-related support.

Therefore, the global spread of art therapy may depend not only on its effectiveness but also on how adaptable it is to different social and medical contexts.

4. Conclusion and Future Prospects

This study suggests that art therapy has significant potential to improve mental healthcare and support cognitive health, including possible dementia prevention.
The research question can be answered by concluding that art therapy can enhance healthcare systems if it is properly implemented and supported.

For art therapy to spread globally, it is important to create flexible systems that respect cultural differences while maintaining professional standards.
Establishing international guidelines for art therapy education and certification may help reduce disparities between countries.

In the future, governments and healthcare institutions should consider incorporating art therapy as a complementary treatment alongside conventional medical approaches.
On a personal level, further research and practical experience in art and psychology could contribute to developing more accessible mental health support for diverse populations.

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・Active Visual Art Therapy and Health Outcomes～A Systematic Review and Meta-Analysis～

Ronja Joschko, Caroline Klatte, Weronika A. Grabowska, Stephanie Roll, Anne Berghöfer, Stefan N. Willich
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Aiming for an independent storage system

～To reduce the number of people suffering from hunger～

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Abstract

Many developing countries discard large quantities of agricultural produce due to a lack of technology and equipment. I consider it a serious problem that food waste occurs in ways beyond people's will. Therefore, Meghalaya State, which has particularly high levels of food waste and poverty rates, was selected as a model region for addressing hunger issues. After examining the characteristics of Meghalaya State, I considered countermeasures. That is the “RS Project.” It involves building storage facilities in Meghalaya State that local communities will jointly use and operate. Going forward, the goal is to consider more specific aspects such as the construction site and facility scale, as well as the costs associated with building and operating the facility.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

In recent years, the number of people suffering from hunger has been increasing in developing countries due to food shortages. However, at the same time, vast amounts of food are being thrown away there. This is due to the lack of knowledge, technology, and insufficient funds for improvements in developing countries. This is due to the lack of knowledge and technology in developing countries. Despite the fact that there is actually enough food to feed the whole population, one-third of the world's food production is wasted, while one in nine people suffer from hunger. This situation is extremely problematic.

1-2. Previous Research

In my research last year, I read a paper published in 2020 by Naho Watanabe of Yamanashi University. According to that paper, various initiatives are being undertaken to address hunger issues in developing countries, such as the “Project to Improve Grain Storage and Access to Information in Mexico (Note 1)” and the “Food Bank in the Philippines (Note 2).” However, due to a lack of technology and funding, as well as underdeveloped infrastructure, they have not been able to achieve results. Therefore, I concluded that it would be difficult for this study to resolve the food waste and hunger issues in all developing countries. Therefore, this study will focus on regions within developing countries that have particularly high numbers of people suffering from hunger.

※Note 1 Project to Improve Grain Storage and Access to Information in Mexico

A World Bank project aimed at improving grain storage facilities and access to information for small-scale grain producers. The business plan has been created, but it is awaiting the execution of the subsidy, and the PDO indicator (Project Development Objective indicator) is 0.

※Note 2 Food Bank in the Philippines

A research project by the University of Tokyo Graduate School conducted in the Philippines to deliver surplus food to the impoverished. Processed foods were easy to transport, whereas agricultural products were difficult to transport due to their short shelf life.

1-3. Research Question (RQ)

In my research last year, based on prior studies and survey data, I concluded that strategy for food waste and hunger issues in developing countries can be categorized into the following three approaches. ① Construction and maintenance of storage facilities, ② Infrastructure development, ③ Improvement of food processing technology. Among these, I decided to focus my research on ①Construction and maintenance of storage facilities, as this seemed the most feasible short-term solution and could directly reduce food waste. Therefore, my research question is how can people living in rural areas of Meghalaya state in India secure an independent storage system? Meghalaya state in India has a high poverty rate even within India (which has the world's largest hungry population), and people continue to starve to death. Therefore, I believed that if we could reduce the number of people suffering from hunger in India's Meghalaya state, the mechanisms and methods employed could be applied in other Indian states and other countries such as China.

Table 1: India State Hunger Index 2017 and Its Component Indicators

State	PUN[1]	CWA[2]	CST[3]	CM[4]	India State Hunger Index Scores and Rank	Rural India State Hunger Index Scores and Rank	Urban India State Hunger Index Scores and Rank
Himachal Pradesh	1.6	13.3	26.1	3.8	17.8 (1)	17.8 (1)	17.5 (2)
Lakshadweep	2.4	13.0	29.8	3.0	18.2 (2)	20.3 (4)	19.4 (4)
Jammu and Kashmir	4.3	12.7	28.0	3.8	19.1 (3)	18.4 (2)	21.4 (7)
Manipur	16.3	6.8	28.5	2.6	19.8 (4)	20.1 (3)	19.8 (5)
Tripura	4.7	17.1	23.9	3.3	20.3 (5)	21.8 (7)	15.6 (1)
Mizoram	13.8	6.1	28.3	4.6	20.3 (5)	24.9 (12)	15.6 (1)
Andaman and Nicobar Islands	8.9	18.6	23.1	1.3	20.8 (6)	22.5 (8)	–
Punjab	7.7	15.5	25.6	3.3	21.1 (7)	20.8 (5)	21.5 (8)
Telangana	8.6	16.8	27.6	3.2	22.5 (8)	25.5 (13)	19.0 (3)
Sikkim	10.2	15.3	29.3	3.2	22.8 (9)	23.6 (10)	21.6 (9)
Nagaland	15.7	11.3	28.6	3.7	23.2 (10)	23.2 (9)	20.3 (6)
Chandigarh	22.1	8.5	27.7	3.8	24.2 (11)	–	24.4 (12)
Kerala	24.2	16.1	19.6	0.7	24.4 (12)	24.6 (11)	23.3 (10)
Uttarakhand	2.8	19.9	33.0	4.7	24.5 (13)	24.6 (11)	24.7 (13)
Pondicherry	9.4	24.2	24.0	1.6	24.6 (14)	23.6 (10)	24.9 (15)
Andhra Pradesh	12.3	16.8	30.9	4.1	25.7 (15)	25.9 (14)	24.8 (14)
Delhi	15.7	15.5	30.6	4.2	26.4 (16)	–	27.0 (17)
Goa	18.0	23.5	21.4	1.3	26.9 (17)	20.9 (6)	29.6 (21)
Daman and Diu	10.7	26.4	21.5	3.4	27.5 (18)	26.6 (15)	30.4 (23)
Haryana	9.7	21.1	33.3	4.1	27.6 (19)	27.4 (16)	28.2 (19)
Odisha	10.6	19.8	33.6	4.8	28.0 (20)	28.8 (17)	23.3 (10)
West Bengal	14.9	19.8	32.4	3.2	28.0 (20)	29.3 (18)	24.4 (12)
Assam	15.3	16.8	35.8	5.6	29.6 (21)	30.2 (19)	23.5 (11)
Tamil Nadu	23.1	19.8	27.3	2.7	29.6 (21)	31 (22)	27.9 (18)
Maharashtra	13.0	25.3	33.9	2.9	30.3 (22)	30.6 (20)	29.7 (22)
Rajasthan	10.4	22.7	38.4	5.1	30.9 (23)	30.8 (21)	30.8 (26)
Karnataka	17.8	26.6	35.7	3.1	33.7 (24)	35.4 (26)	31.0 (27)
Arunachal Pradesh	34.5	17.2	29.2	3.3	34.0 (25)	36.3 (27)	25.1 (16)
Uttar Pradesh	14.4	17.5	45.9	7.8	34.1 (26)	34.3 (23)	33.0 (30)
Chhattisgarh	15.7	22.8	37.5	6.4	34.2 (27)	35.1 (25)	30.7 (25)
Bihar	14.6	20.6	47.8	5.8	34.5 (28)	34.9 (24)	30.6 (24)
Gujarat	19.2	26.2	37.9	4.3	35.7 (29)	40.1 (30)	29.6 (21)
Madhya Pradesh	15.0	25.4	41.7	6.5	36.4 (30)	37.7 (28)	32.7 (28)
Jharkhand	16.5	28.3	44.3	5.4	38.3 (31)	39.5 (29)	32.8 (29)
Dadra and Nagar Haveli	28.6	25.0	39.5	4.2	39.3 (32)	47.7 (32)	28.6 (20)
Meghalaya	40.6	15.4	43.7	4.0	39.6 (33)	40.8 (31)	33.6 (31)
India	14.8	20.8	37.9	5.0	31.5	32.6	28.5

(https://oar.icrisat.org/12744/1/Economic%20and%20Political%20weekly_LIX_24_113-116_2024.pdf)

1-4. Hypothesis

Measures to reduce the number of people suffering from hunger include donating to food banks and buying fair trade products from companies committed to the SDGs. However, these conventional approaches are undesirable because they place the responsibility for solving the

hunger problem on developed countries. The objective of this study is to ensure stable food security for people living in rural areas of Meghalaya State. Therefore, this study posits that promoting storage facilities and establishing mechanisms to ensure self-reliant storage systems are effective approaches to addressing hunger issues in Meghalaya.

2. Research Method

① Use the internet to identify regions within developing countries with high levels of hunger and food waste.
② Find to previous research on initiatives to address hunger issues in developing countries and consider the challenges.
③−1 Classify the challenges and determine which ones to focus on in this study.
③−2 Research countries with large populations suffering from hunger and high levels of food waste and determine the locations to focus on in this study.
④ Determine the research question and formulate a hypothesis.
⑤−1 Use the internet to research the major agricultural products in Meghalaya state, India.
⑤−2 Use the internet to consider what kind of storage facilities are needed in Meghalaya state, India.
⑤−3 Consider methods for promoting storage facilities.
⑥ Consider the problems and challenges of this research.
⑦ Consider future prospects, including ways to resolve challebge ⑥.

3. Results and Discussion

3-1 Results（結果）

①About India's Climate

India has a tropical and subtropical climate. Additionally, India is influenced by the monsoon. India's agricultural production is substantial across all major crops: jute ranks first globally in production, pulses also rank first, rice and wheat both rank second after China, and rapeseed ranks third. Rice has the highest production volume, accounting for 40% of total grain production.

②About current Status of Storage Facilities in India and Japan

In Japan, rice is stored in communal storage facilities called country elevators (Picture ①) or low-temperature agricultural warehouses (Picture ②). On the other hand, in India, only a few large-scale farmers use storage facilities, while small-scale farmers can't properly preserve their crops.

Left Picture ① Right Picture②

3-2 Discussion（考察）

The key considerations for establishing mechanisms to promote storage facilities and secure an independent storage system are these three points: ① The types of agricultural products to be stored, ② The types of storage facilities to be used, ③ The methods for promoting the adoption of storage facilities.

①The types of agricultural products to be stored

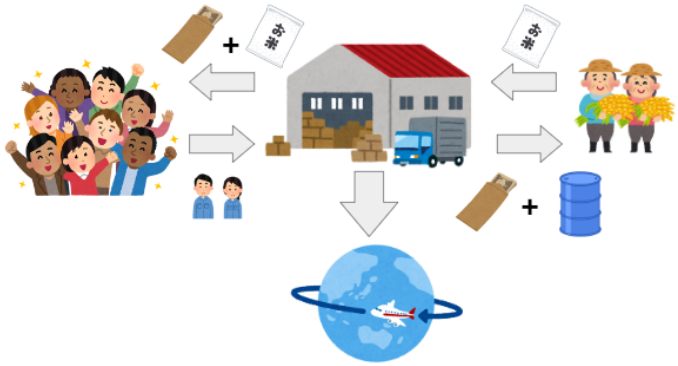
According to Result ①, among grains, rice has the highest production volume, accounting for approximately 40% of total grain production. Moreover, since rice production is also high in the state of Odisha, which is the focus of this study, rice was selected as the target grain for this research.

② The types of storage facilities to be used

According to Result ②, small-scale farmers in India are forced to sell their crops at low prices during harvest season. Therefore, I concluded that it was necessary to first construct several small-scale joint storage facilities to enable the use of independent storage facilities in India.

③The methods for promoting the adoption of storage facilities

In India, where storage facilities are insufficient, the use of shared storage facilities is expected to be accepted locally. However, it is difficult for local people to operate storage facilities. Therefore, it is anticipated that in order to promote the adoption of these shared storage facilities, it will be necessary for Indian people to become capable of operating these facilities within their communities. This will increase job opportunities and enable more people to find employment. Moreover, I believe that distributing surplus rice to facility workers provides them with a reason to continue working and reduces rice waste.



I believe that implementing the RS Project will contribute to solving hunger issues in Meghalaya, around the world. Future prospects involve considering more specific details such as the construction site and facility scale, the costs associated with building and operating the facility.

4. Conclusion and Future Prospects

Based on the preceding analysis, in order for rural residents in Meghalaya, India, to secure a stable food supply, it is necessary to "construct communal rice storage facilities and enable local residents to operate these facilities." Therefore, I propose the Rice Storage Project in Meghalaya, as the "RS Project." (See the diagram below) Its main functions are two points.

The first is a partnership between farmers and facilities. First, purchasing rice that would otherwise be discarded from farmers at the standard price. At this time, points will be awarded based on the quantity and number of rice purchases made. These points can be exchanged for rice storage drums. The goal is to gain the trust of local residents in the facility and to have them learn how to use it. The reason I established a drum can exchange system was that I concluded that new facilities alone would not be sufficient to store all the rice.

The second is partnering with local communities. In Meghalaya, hiring unemployed individuals to operate storage facilities.

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Learning Effect of Bookbinding

～About the Effectiveness of Literacy Study Southeast Asia～

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Abstract

Based on UN literacy rate data, this study examines the reasons for low literacy rates in Asian countries and investigates whether bookbinding initiatives could potentially improve these rates.

1. Introduction (Background, Significance, and Purpose)

In today's rapidly evolving world, maintaining literacy skills is often overlooked because it is considered a fundamental and basic requirement.They are replaced by the word “education,” and we rarely consider what education itself truly entails.According to the United Nations, many countries in Southeast Asia and West Asia have lower literacy rates(※) compared to developed nations and European countries.Literacy is deeply connected to “the nature of brain and body development” and directly relates to factors that reduce “choices”.And it hinders “Human Development.”

In other words, in developing countries, acquiring literacy is a means to break the cycle of poverty.Currently, approximately 10% of the world's population—over 750 million people—are considered illiterate.In reducing illiteracy, I focused my research on the question “Is bookbinding an effective means to improve literacy rates?”

※The word “literacy rate” as I use it here means which has indicated a number of people in a specific country who can understand a certain number of words, read and write to manage daily life.UNESCO further emphasizes the importance of acquiring knowledge essential for daily life and its effective utilization for regional development. In Japan's case, this figure is estimated at 99%.

1-1. Social Context (Current Situation and Problems)

First, we turned our attention to Asia because these regions are close to Japan, and numerous initiatives already exist targeting them. Of course, the situation in Africa remains even more severe than in the Middle East or Southeast Asian countries. However, these regions are distant from Japan, making sustained support practically difficult. Since we envisioned support based in Japan, we limited the regions this time. On the other hand, the current state of literacy varies significantly by region, making it difficult to aim for 100%. In many countries, literacy rates differ by gender due to religious views.

1-2. Previous Research

Examples of improving literacy rates worldwide are few.This is because international support for the category of education is measured on a global scale.In fact, there are numerous “education” initiatives related to literacy rates.However, research on literacy rates is scarce.Finding prior research is nearly impossible.This is because prior research relies on individual fieldwork.This time, I will introduce this research.

This study, titled “The Significance and Challenges of Literacy Education in Conflict-Affected Countries,” focuses on Afghanistan.Previous research cited in this study included “discussions incorporating regional conflicts as a theme.”Regarding literacy classes, while many opinions were positive about continuous learning and acquiring knowledge useful for daily life, local feedback also indicated that participation was difficult due to conflict and financial constraints.Even among positive opinions, the reasons and significance for learning can be categorized into multiple purposes.

Therefore, it is crucial that literacy classes be designed with an understanding of participants' needs.Furthermore, improving literacy skills carries the risk of leading to further discrimination or conflict. In Afghanistan, literacy skills have indeed been exploited for political purposes in the past.In summary, while there is demand for learning opportunities, the complexity of the demand's specifics and associated risks makes long-term, broad-scale support challenging.

1-3. Research Question (RQ)

How can people from developed countries raise the literacy rate of Southeast Asia?

My research question is whether undertaking a bookbinding business can be considered effective.This research question requires several clarifications.

First, much of the current education-related support focuses on primary education, and programs accessible to those aged 15 and above (such as literacy classes) are severely limited.

Second, while support related to primary education includes providing picture books, and some organizations distribute picture books produced by us, such efforts are restricted to the Asian region due to reasons like transportation.Thus, while support in areas like picture books and education is being provided, it is clear that various challenges remain.

1-4. Hypothesis

Japan provides substantial aid to Asian countries, but does it extend assistance to other regions?Furthermore, can bookbinding initiatives be considered effective as a measure to improve literacy rates?

First, even if Japan does provide aid to other regions, I believe it is on a small scale.Second, I believe bookbinding initiatives themselves are effective.

2. Research Method

Understand how current initiatives are structured and consider research questions Specifically, I want to use the internet to investigate initiatives in other countries as well.

3. Results and Discussion

3-1 Results（結果）

As expected, my research showed that Asia was the most common destination for Japanese aid.Focusing specifically on “literacy” and “books,” I found that large-scale initiatives to deliver books to Africa are underway in the United States and the United Kingdom.In other words, regardless of the type of aid, it often tends to be limited to regions closer to the donor country.

This characteristic can largely be attributed to transportation costs.Furthermore, in Japan's case, it was also found that most of Africa is designated as Travel Risk Level 4.Indeed, the risk involved in travel was cited as a reason for hesitating to provide aid to African countries.Given these points, limiting the research focus to Asia, particularly Southeast Asia and West Asia, was likely a sound decision.

Within Asia, West Asia has particularly low literacy rates. However, in these countries, low literacy stems from religious or ideological reasons, raising questions about the feasibility of foreign educational support.Regarding Southeast Asia, while the proportion of illiterate people relative to the population is relatively low, significant challenges remain. Moreover, it is no exaggeration to say this region is the closest potential aid destination to Japan.

3-2 Discussion（考察）

I would like to consider the challenges of fieldwork in these two regions.Regarding the second hypothesis, it became clear that in areas with high illiteracy rates, people have few opportunities to encounter written language in the first place.If even a small opportunity to encounter written language existed in daily life, it would likely yield results.

On the other hand, these regions have unique climates, and it is unknown how long paper books would last. Moving forward, we must consider not only social

conditions but also natural factors.

4. Conclusion and Future Prospects

Based on these considerations, I would like to propose implementing a “bookbinding project” to improve adult literacy rates in West Asia and Southeast Asia.

The mechanism would involve having local people produce some of the picture books we have previously created and delivered. We would then purchase these books and donate them to primary education facilities and similar institutions.First, the popularity of our picture book support stems from the fact that “we can experience it ourselves,” and this initiative remains necessary going forward.However, the picture books completed through this support are sent to primary education facilities and orphanages, meaning they do not contribute to improving literacy rates among adults aged 15 and over.And initiatives specifically aimed at improving literacy rates for those aged 15 and over are essentially limited to literacy classes, and it is known that this activity also faces various challenges.

Therefore, I proposed this approach, thinking that expanding existing activities would likely be the simplest and most effective course of action at present.This proposal presents two problems. The first is cost. The second is the significance of our intervention. Regarding the first, since this applies equally to other research, I will omit the introduction here.Regarding the second point, since we must prepare the source material for the picture books and the proposal involves expanding beyond existing activities, our involvement is absolutely necessary.

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Food Hygiene Management in Vietnamese Restaurant and Stall

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Abstract （研究の概要）

This research looks at the problems of poor food hygiene and the lack of hygiene knowledge among workers in Vietnam's food-service industry. Previous studies have reported that cases of food poisoning are increasing and that many workers do not receive enough training. To solve these problems, this study suggests creating a new vocational school that teaches food hygiene through both classes and practical training. The school aims to help students learn basic hygiene management, how to handle food safely, and how to prevent accidents during cooking. This plan is expected to raise hygiene standards in the food-service industry and help create a safer eating environment. Future work includes making a detailed curriculum and setting up a system to run the school.

1. Introduction (Background背景, Significance意義, and Purpose目的)

Recently in Vietnam, there is a serious food hygiene problem. When I lived in Vietnam, I experienced many types of restaurants or stalls. Of course, there are a lot of nice restaurants and stalls but some of them are not good for our health because they are unhygienic. I want to make unhygienic restaurants into hygienic restaurants. Also, I felt that Hanoi, the capital city of Vietnam, is much dirtier than other cities like Danang and Ho Chi Minh. I know that the capital city tends to be contaminated because there are a lot of people including foreigners. Nevertheless, it is not good for everyone to live in that city. I believe that solving food hygiene problems leads to the city's beauty. So, in this research, the goal is to manage hygiene in the correct way when people make, process, cook and sell to serve safe food or dishes.

1-1. Social Context (Current Situation and Problems)

In 2024, there were 2,138 food poisoning patients in Vietnam from January to June. I'm not sure if the number of patients is too much or not, but it is increasing year by year, so I believe that food poisoning is a serious problem. It is said that because of a lack of awareness of employees and they don't know about food hygiene, the problem doesn't disappear. To solve this problem, we need this research.

1-2. Previous Research

Several studies have discussed the current situation of food hygiene in Vietnam. According to past research, many restaurants and food businesses do not follow government rules strictly. Some studies say that Vietnam needs to invest more money in food facilities and safety systems. Other studies show that many workers do not have enough training, so they cannot manage hygiene well.

Past research mainly focused on describing the situation, but they did not present concrete solutions. These studies also did not discuss how to educate workers efficiently. For this reason, my research connects with previous research by trying to find a practical solution through school education for future workers.

1-3. Research Question (RQ)

What is the most effective school education program to improve food hygiene management in Vietnam?

This question is important because Vietnam has many problems related to food safety,

such as increasing food poisoning cases, low awareness among workers, and a shortage of trained staff. If schools can provide the right education, students can become skilled workers when they enter the food industry. This may reduce food-related accidents and improve public health.

1-4. Hypothesis

My hypothesis is that students should start learning about food hygiene from the third year of lower secondary school and continue training in the fourth year. If schools use the last class period of each day (the sixth period) for this program, students can learn basic knowledge in the third year and join practical training in the fourth year.

Past research says that Vietnam needs more investment and more skilled workers. Based on this, I believe that giving students one year of classroom learning and one year of practical training will help them become “ready-to-work” employees. This system may reduce the number of unhygienic restaurants and improve food hygiene management in Vietnam.

2. Research Method

This study adopted a literature-based research method combined with a comparative analysis of educational structures in Vietnam and Japan. First, academic papers, government reports, and news articles written in Japanese, English, and Vietnamese were systematically collected using academic databases and official government websites. These sources were categorized into three groups: (1) documents on food hygiene problems in Vietnam, (2) studies on food safety education, and (3) materials on Vietnamese secondary school timetables and educational systems.

Second, to verify the hypothesis regarding the feasibility of implementing food hygiene education at lower secondary schools, actual school schedules from a Vietnamese public school were analyzed. By calculating available class hours, the study examined whether a two-year program combining lectures and practical training could be realistically introduced.

Finally, findings from literature and timetable analysis were compared with the researcher’s own observations during residence in Vietnam. This triangulated approach enabled both theoretical validation and practical evaluation of the proposed educational program.

3. Results and Discussion

3-1 Results（結果）

The analysis yielded three main results.

(1) Current Issues in Vietnam’s Food Safety:

Literature consistently reported that Vietnam faces frequent food poisoning incidents, insufficient hygiene regulations, and low awareness among food-related workers. Several studies emphasized that lack of training and outdated management systems are major causes of these problems.

(2) Educational Structure and Available Time:
The examination of Vietnamese lower secondary school timetables showed that both Grade 8 and Grade 9 students have one free period in the sixth lesson slot. Calculating annual school days and lesson duration revealed that approximately 108 class hours per year could be allocated to a vocational or hygiene-related program without disrupting the existing curriculum.

(3) Comparison Between Existing Research and Local Observations:
While previous research highlighted workers' lack of hygiene awareness, the researcher's on-site experience confirmed the same tendency, especially in small and informal food stalls. Both sources indicated that current training is insufficient and that younger workers often start employment without basic knowledge.

3-2 Discussion（考察）

These results support the initial hypothesis that a school-based program could effectively improve hygiene awareness and provide immediate workforce benefits.

First, the significant gap between public hygiene standards and actual practices indicates that early education is essential. Existing studies emphasized structural issues, yet few proposed interventions within the education system. Therefore, the proposed curriculum serves as a novel approach from an innovation and long-term capacity-building perspective.

Second, although 108 hours per year may seem limited, comparisons with Japanese restaurant training programs—which often require around 100 hours—suggest that a structured combination of lectures and practical exercises could still cultivate competent workers.

Finally, integrating the findings from international research shows that countries with strong hygiene cultures typically include food safety in school curricula. This supports the idea that Vietnam could benefit from implementing similar educational practices.

In summary, literature trends, quantitative timetable analysis, and personal observations collectively indicate that school-based food safety education is both feasible and potentially transformative.

4. Conclusion and Future Prospects

In response to the research question, "What is the most effective school education program for improving food hygiene management?", this study concludes that the most effective approach is a two-year curriculum implemented in Grades 8 and 9, using the sixth lesson period. The program should include one year of foundational lectures on food hygiene and one year of practical training focusing on safe cooking and workplace sanitation.

This program could simultaneously address Vietnam's major challenges: low hygiene awareness, high food poisoning risk, and shortages of trained workers in the food industry. By producing job-ready graduates, it may reduce workplace accidents, enhance urban sanitation,

and contribute to stable economic development.
Future research should focus on developing a detailed syllabus, designing weekly lesson plans, and estimating the cost of training teachers. It will also be necessary to consider complementary education programs for adults already working in the food sector. Through these steps, the proposed curriculum can move closer to practical implementation.

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How can we provide primary education in developing countries through a self-learning environment?

～ teaching materials and learning community ～

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Abstract （研究の概要）

This study focuses on how to provide primary education in developing countries. In this

study, I refer to previous research and analyze it. I found that there are many children who cannot go to school for various reasons such as households, labor, and sometimes geographic problems. So I think it is important to prepare the environment that suits each child's lifestyle by providing a self-learning system. However, there are some problems in cost and language barriers. I want to consider them moreover.

1. Introduction (Background, Significance, and Purpose)

In many parts of the world, children cannot attend school for various reasons, such as child labor, household responsibilities, poverty, or geographic problems . These difficulties prevent them from receiving even the most basic level of education. However, primary education is essential for living a stable and independent life. Without basic literacy and numeracy skills, children may be excluded from social participation, including activities like voting or understanding public information. They also face a higher risk of exploitation and have fewer opportunities to shape their future, which can lead to the cycle of poverty continuing across generations.

The purpose of this research is to explore how primary education can be made accessible to children who cannot regularly attend school. By focusing on self-learning environments, the study aims to provide realistic and sustainable ways for children to gain essential skills, even in difficult circumstances. The significance of this research lies in its potential to protect children's rights, expand their future possibilities, and ultimately contribute to breaking long-term poverty cycles.

1-1. Social Context (Current Situation and Problems)

In many countries, children are unable to attend school because of poverty, household duties, child labor, or unsafe living conditions. As a result, they miss the chance to gain basic skills that are necessary for understanding information, protecting their rights, and participating in society.

This issue needs attention because a lack of primary education makes children more vulnerable to exploitation and limits their future opportunities. It also strengthens social inequality and slows community development. Ensuring access to basic learning is essential for creating a society where every child has the chance to build a better future.

1-2. Previous Research

Many international organizations and NGOs have tried to expand access to primary education by building schools, training teachers, and providing free learning materials. These efforts have helped increase enrollment rates in several regions. However, they have not solved the deeper barriers that prevent children from continuing their education. Long travel distances, household responsibilities, and child labor still make regular attendance difficult. Even when schools exist, many children simply cannot be there every day.

Because of these limitations, relying only on school-based education is not enough. To ensure that all children can learn, even in unstable or restrictive environments, a system that allows self-directed learning becomes essential. Providing tools and materials that enable children to study on their own can fill the gap that traditional schooling cannot overcome.

1-3. Research Question (RQ)

In many developing regions, children struggle to attend school regularly because of responsibilities like household work, long travel distances, and even labor. Existing educational support often assumes that students can physically attend school, which does not match their real lifestyles. To address this gap, my research asks: How can we create a self-learning environment that allows children to continue their basic education independently, in ways that fit their individual living conditions and daily routines?

1-4. Hypothesis

I hypothesize that building flexible self-learning environments is an effective solution for children who cannot attend school due to work, household responsibilities, distance, or unstable living conditions. Because their daily schedules are unpredictable, education must adapt to their lifestyle—not the other way around. Therefore, providing a range of self-study materials could allow each child to learn whenever time and safety permit.

First, distributing simple printed textbooks and basic workbooks would give students access to fundamental content without requiring a formal classroom. However, many children in these regions may not yet have literacy or numeracy skills, which means they cannot immediately benefit from written materials. For this reason, offering DVDs or CDs that teach basic reading, writing, and arithmetic could serve as an essential "entry point" for learning. These audio–visual tools require minimal prior knowledge and can be used independently, making them especially practical in areas where adults are too busy to assist with study.

In addition, to promote long-term motivation and avoid isolation, I propose forming local learning communities where children can study together when possible. These groups would not need to meet regularly; even occasional gatherings can create a sense of shared purpose and help maintain persistence. Along with this, periodic visits from local teachers—light, simple, and not overly formal—could provide guidance, check progress, and offer support without disrupting children's daily responsibilities.

Taken together, these measures have the potential to make primary education more accessible, more realistic, and more sustainable. By tailoring learning resources to each child's lifestyle, it becomes more likely that they can continue studying even in difficult environments. This approach could significantly reduce educational disparities and help more children gain the basic skills needed for future opportunities.

2. Research Method

This research mainly uses online information gathering to understand current challenges in primary education access and to explore examples of self-learning programs around the world. In addition, I analyze previous studies related to out-of-school children and flexible

learning systems. By comparing these sources, I identify practical strategies that could support independent learning for children who cannot attend school regularly.

3. Results and Discussion

3-1 Results（結果）

Through online research and the review of global education reports, several important findings became clear. First, UNESCO data shows that more than 60 million children still lack access to primary education, and many of them live in rural areas where schools are far away or where families depend on children's labor. Internet access is also extremely limited in many regions, which makes digital learning difficult.

Second, case studies such as UNICEF's "Learning Passport" and the "Teaching at the Right Level" program in India reveal that simple, low-cost self-learning materials can significantly improve basic reading and math skills. These programs succeed especially when learning does not rely on the internet and when children can study at their own pace.

Third, multiple reports point out that motivation decreases easily when children study alone. Projects that include community study groups or periodic visits from local educators show higher continuation rates. This suggests that independent learning works best when supported by local communities or light-touch teacher involvement.

Overall, the results indicate that self-learning materials, combined with flexible support systems, can effectively help children who cannot attend school regularly due to their lifestyle or environment.

3-2 Discussion（考察）

The results show that self-learning materials can help children who cannot attend school because of distance, labor, or family responsibilities. Simple and offline tools are especially effective for improving basic reading and math skills.However, the research also suggests that learning alone is difficult to continue. Many students lose motivation without support, and their living environment still limits study time. This means that self-learning must be paired with community support or light teacher involvement to truly work.

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4. Conclusion and Future Prospects

This study suggests that creating an environment where children can learn independently is a practical way to support those who cannot attend school regularly. Providing simple learning tools—such as basic textbooks, offline materials, and audio or video resources—can help children build essential skills even in difficult conditions. At the same time, light support from local teachers or community groups increases the chance that students will continue learning

and stay motivated.
Yet, several issues remain. Many children still face heavy responsibilities at home, and the lack of stable study time limits their progress. In addition, self-learning materials alone cannot fully replace the broader role of formal schooling. These points show that self-learning should be seen as a complementary approach, not a complete solution.

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To Raise Educational Standards in Sub-Saharan Africa

～Toward a System That Benefits All Relevant Countries～

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Abstract

In this study, I focused on the education gap in Sub-Saharan Africa. I tried to think how we can divide nationalized and non-nationalized education in a good way, so children can learn more smoothly. I also suggest that support countries, which I call “aid countries,” help Sub-Saharan Africa with a vertical support system, and also make horizontal connections between aid countries so their education level also gets better. This study shows a possible solution to reduce global education inequality.

1. Introduction (Background, Significance, and Purpose)

In the world today, many children cannot get enough education because of the environment they are born in. Especially in developing countries, education access and quality are still low, and this is a big problem. In this research, I want to find a way that can support Sub-Saharan Africa and also bring some benefit to the aid countries, so the support can continue for a long time.

1-1. Social Context (Current Situation and Problems)

Education inequality means that some children cannot receive the education they should get. The UN Convention on the Rights of the Child says every child has the right to go to school, but still many children cannot. UNICEF reported in 2018 that about 303 million children aged 5–17 are not in school, and more than one-third of them are affected by war or natural disasters. In Africa, poverty is very serious, and many children must work instead of going to school. Sub-Saharan Africa is the most serious region. A 2019 UNICEF report says that 19% of boys and 24% of girls do not enroll in primary school, and only 64% finish it. So the education gap is very big and needs to be solved.

1-2. Previous Research

A study called *“Possibility of Japanese Aid for Basic Education in Sub-Saharan Africa”* explains that Sub-Saharan Africa has problems like low education quality, lack of money, weak infrastructure, low teacher salary, and language diversity. In the 1990s, many places tried education reform and moved from nationalized systems to non-nationalized ones with more community participation. But this can also make inequality bigger, so it is not simple.
This connects to my research because I also think about how to use nationalization and non-nationalization. That study says Japan should make new aid approaches and work together

with other countries. So in my research, aid countries are not only Japan but many. I want to think how they can connect with each other to improve Africa's education and also their own.

1-3. Research Question (RQ)

My research question is: How can we support Sub-Saharan Africa in a way that also gives benefits to the aid countries?
I think support cannot continue if only Africa gets benefits. Aid countries also need some positive effect, so this question is important.

1-4. Hypothesis

My hypothesis is that many aid countries make one team to support Sub-Saharan Africa. They will mainly give internet-based education. The aid countries will provide devices and internet access, and Africa can use these to study more easily. I think this can help both sides.

2. Research Method

First, I read many previous studies about education in Sub-Saharan Africa. Then I checked the current situation of different African countries and also thought which countries can become aid countries. I collected information from books, papers, and online academic sources. After that, I made ideas about how the support system can work, and I analyzed how my hypothesis can answer the research question.

3. Results and Discussion

3-1 Results

From the literature, I found that grouping areas by same languages can make education easier, because Africa has very diverse languages. I also found that school construction should be supported widely by aid countries (a more nationalized style), but school management should be more local (a non-nationalized style).
Aid countries can send about 5% of teachers as technical supporters. The main education method will be internet learning using the devices donated by aid countries.
I also found that aid countries can learn from each other by sharing education ideas.

3-2 Discussion

These results show that a mixed style of nationalized and non-nationalized education may work well. Grouping students by language helps them understand better. Local management can make children join more actively.
Internet education can reach many students at once, and aid countries can also grow because they share knowledge and maybe expand their industries.
Different studies had different opinions about nationalization, but when I compare them, I think a hybrid style is the best. This is also a kind of innovation because it uses both technology and international cooperation.

4. Conclusion and Future Prospects

To improve education in Sub-Saharan Africa, we must give as many children as possible access to learning. So I suggest internet education using big screens for groups of about 20 children. This costs less and needs fewer teachers.
Aid countries can get benefits too—for example, by using their own device brands, they can expand industries and also gain a better reputation in international society.
However, problems still remain, like how to get enough aid countries, how long the support should last, and what to do if devices are stolen or sold. In the future, I want to research these problems more deeply.

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Fight hunger with soy-based meat

~The possibility of sustainable foods~

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Abstract （研究の概要）
I am interested in the kind of food industries, so I focused on the World Hunger Problem. Now, the livestock industry is a big environmental problem, and I found soy-based meat to solve the problem. First, I researched the livestock industry's problem, the environmental problem, what is soy-based meat and the supplies supported by UNICEF. Second, I looked for the problem to support hunger with soy-based meat. Third, I ate soy-based meat actually. In conclusion,soy-based meat is capable of supplying. To supply sustainably, I am going to suggest how to cut the cost to make soy-based meat and to make it by themselves.

1-1. Social Context (Current Situation and Problems)
In the beginning, I researched the problem of the livestock industry. Now, in the livestock industry, because livestock farms are getting larger, cities and countryside are becoming mixed, and people care more about environmental problems, issues such as bad smells and water pollution caused by animal waste have begun to appear. Also, the amount of greenhouse gases produced by livestock is much larger than the amount produced by vehicles. Methane and nitrous oxide, which are released when animal manure is composted, are much stronger greenhouse gases than carbon dioxide. In addition, one-third of the world's water resources are used for the livestock industry. Amazingly, 91 percent of the destruction of the Amazon rainforest is caused by livestock farming.
Next, I researched soy-based meat. Soy-based meat is a food which is made from soy and something which has plant-based protein. There is no clear definition, but It is said to refer to products made mainly from plant-based ingredients that recreate the texture and taste of real meat. In addition, because they are plant-based, they last longer than animal meat, and some of them have only about half the calories of animal meat. Also, they do not have the strong smell that animal meat often has, and their taste and quality are good.
Finally, I researched the current situation of hunger. The number of people affected by hunger around the world has increased by 150 million since the COVID-19 pandemic began, reaching 828 million in 2021. One example of the foods supplied by NPOs and NGOs includes grains, edible oils, beans and other protein sources, mixed foods, iodized salt, sugar, and high-calorie biscuits. Other supplementary foods include local fresh foods, spices and seasonings, tea, powdered milk, and therapeutic milk.

1-2. Previous Research
I found a way to make soy-based meat by using modern technology.
"In this study, we developed a highly palatable food material made from soybeans that can compare with the texture and flavor of animal meat. To do so, we produced meat alternatives with the following specific goals:
(1) to have a texture that recalls uneven and directional muscle tissue, rather than a uniform structure like freeze-dried tofu;
(2) to find a method for producing large block-type meat alternatives;
(3) to contain a rich amount of lipids, which conventional textured vegetable proteins lack; and
(4) to contain abundant protein and contribute to sufficient nutritional intake.

To achieve these aims, we created meat-like structures using the following procedure. First, we produced soybean-protein-containing fibers and mixed them with soybean flour, oils and fats, alginates, and other ingredients. By gelation and freezing, we formed soybean-based structured materials. Next, we infused the gaps of these structured materials with a soybean protein solution and gelled it, thereby producing a meat-like structure."(Journal of Food Engineering of Japan, Vol. 23, No. 1, pp. 35 - 44, Mar. 2022)

"The development of plant protein meat alternatives will not only open up new opportunities in environmental and resource stress relief and improving animal welfare, but also in developing food products with potential health benefits."("The development history and recent updates on soy protein-based meat alternatives",science direct by Tianyi Zhang, Wei Dou, Xin Zhang, Yu Zhao, Yan Zhang, Lianzhou Jiang, Xiaonan Sui, March 2021)

The way could make soy-based meat finally,but the way doesn't have any sustainable supply. Also, it is difficult to make it, so I will study whether the support can be continued sustainably and whether the production methods are easy to carry out.

1-3. Research Question (RQ)

To take responsibility for supporting poor countries. If we stop supplying suddenly, poor countries will be confused to be alive. However, if we ignore environmental problems in order to continue the support, it would defeat the original purpose. Furthermore, I think about how we support hunger sustainably and make soy-based meat by ourselves in the place where hunger lives. I aim for environmental supply and developing poor countries to live by themselves.

1-4. Hypothesis

Based on these, the hypothesis is "If the cost for making soy-based meat could be cut, it would include the protein to supply." Soy-based meat is able to be supplied without considering religion, and we can supply protein, one of the three major nutrients. In addition, it is slower than animal protein for digestion and absorption, so it has the advantage that amino acid levels tend to stay high for a longer time than those of animal protein.

2. Research Method

First, researching on the Internet about the way to make soy-based meat, actually its review and its real taste. After that, thinking of the way to make it, the cost to transport it and the reason why we should use it is based on the conclusion.

How to research the way to produce it is researching on the internet how soybeans are processed to make soy-based meat, and examine the problems in the production process as well as the cost-cutting methods that are actually being used. There is no major soy-based meat in Japan, but overseas deal with it a lot, so I will research it overseas mostly. In addition, I will cook soy-based meat which is sold at the supermarket and give it to my family. My family's opinion will be included in my research.

3. Results and Discussion

3-1 Results（結果）

First, I researched the way to produce soy-based meat. Almost soy-based meat is produced in the type of drying, retort pouch, and frozen. The dry type can keep it all year. To produce the dry type, first, soybeans are pressed with their skins on to extract the oil. The defatted soybeans are then put into special machines, where they are heated and pressurized, and processed into minced, fillet, or block shapes. Finally, they are dried and sterilized at high temperature for about 15 to 20 minutes, cooled naturally, and then packaged. Examples of the shapes include fried-chicken style and thin-sliced meat style.

However, with this method, production is not possible without special machines. Then, I found a person who tries to make food taste like real meat by using everyday ingredients. She was using trial and error to make soy meat hamburg steaks that feel like real meat with common ingredients. In conclusion, she finally succeeded in making a soy meat hamburg steak. She mixed soy beans, konnyaku, onions, mushrooms, and Koya-tofu, and used rice and starch to hold them together. It not only looks like a hamburg steak, but also it tastes like chicken. It is better to supply than using a special machine because it can cut many costs for transportation.

Next, for examples of foreign companies which handle soy-based meat are “Odd Burger” in Ontario, Canada and famous companies like “IKEA”. Odd Burger went public as the world’s first vegan fast-food chain. Its patty is made from chickpeas and seitan (gluten meat). Also, IKEA sells meatballs and hot dogs. Both of them are made from soybeans, and we can buy them at the store. On the other hand, in Japan, there are “Good Good Mart” and “Tanaka Shoku Co., Ltd.” Good Good Mart is an online shop that sells plant-based meat and retort pouches. Tanaka Shoku Co., Ltd. is a tofu shop in Kouchi. It has tofu jerky and uses gluten-free soy sauce, vegan-friendly sugar, and so on.

At the end, I cooked soy-based meat, and I ate and gave it to my family. My father said “If I didn't know it is soy-based meat, I would suspect it is rotten.” My sister said “It tastes like soybeans, so it was delicious.” In fact, I thought it tasted mostly like soybeans, and it also has a firm texture like konjac, so I agree with my father's opinion.

4. Conclusion and Future Prospects

To supply soy-based meat to hunger, using a special machine to produce soy-based meat costs a lot, so I supply them with ingredients for making plant-based meat at home. The food ingredients I support are rice, potato starch, soybeans, konjac, onions, shiitake mushrooms, and freeze-dried tofu. I think major corporations should have been producing plant-based food, so I want them to ask for supply or give me it if they allow. In addition, my opinion for soy-based meat is I would try eating it by using more cooking ideas.

To the next stage, I want to pay attention to the delicious way to eat. And, plant-based protein is less than animal protein as an essential amino acid, so I want to find something we can get

nutrition from instead, such as milk.

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Waste Management Challenges in Developing Countries

:A Case Study of Kenya

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Abstract（研究の概要）

This research examines the growing global waste problem with a specific focus on developing countries, where poverty, limited education, and insufficient infrastructure make effective waste management extremely difficult. Using Kenya as a case study, the research analyzes the country's current waste situation, identifies major challenges, and proposes practical solutions suited to the local environment. The findings suggest that Kenya faces two central issues: an excessive amount of waste and a lack of knowledge about proper disposal methods. To address these problems, the study proposes continuing existing organic waste use as pig feed,

introducing low-cost compost systems, implementing visual waste education in schools and local areas, and gradually adopting AI-based sorting technology in cooperation with developed countries. These combined measures offer a realistic and sustainable approach for improving waste management in Kenya.

1. Introduction (Background, Significance, and Purpose)

Waste management is one of the most urgent global social issues. While developed countries struggle with excessive waste volume and low recycling rates, developing countries face even more severe challenges due to poverty, lack of education, and insufficient waste disposal systems. Among developing countries, Kenya represents a critical case where rapid urbanization, population growth, and limited governmental capacity have exacerbated waste-related problems.

The purpose of this research is to examine Kenya's waste situation, clarify its major issues, and propose realistic and sustainable solutions that fit its social and economic conditions.

1-1. Social Context (Current Situation and Problems)

Waste problems in developing countries are strongly influenced by structural issues such as poverty, lack of educational opportunities, and the absence of proper waste management systems. In Africa, urban populations are increasing at an annual rate of 3.5%, leading to growing amounts of municipal solid waste. Africa generated 174 million tons of waste in 2016, and the amount is expected to reach 244 million tons by 2025.

In rural areas of Kenya, waste collection services are often unavailable. Approximately 60% of the waste is organic, and around 20% is plastic. Despite the seriousness of the issue, effective domestic policies and international support remain limited.

1-2. Previous Research

Previous international studies have examined waste management methods used by different countries:

- Singapore introduces high fines for littering and improper sorting to reform public behavior.
- The United States expands the traditional 3Rs to "4R" by adding Rot (composting), reducing the amount of organic waste that reaches landfills.
- Germany collects recyclable waste from other countries, including developing ones.
- Kenya uses food waste as feed for pigs, offering a low-cost local solution.

While these methods are effective within each country's context, no universal "one global solution" has been identified.

Because living environments, infrastructure, and cultural habits vary greatly, waste problems must be solved through context-specific approaches rather than a single international strategy.

1-3. Research Question (RQ)

Why do waste problems in developing and developed countries require different solutions, and what practical waste management strategy is most effective for Kenya?

This research focuses on Kenya because waste issues are severe, yet national countermeasures and international assistance remain limited.

1-4. Hypothesis

This study hypothesizes that Kenya's waste management challenges can be addressed through a combination of:

1. Reducing organic waste via composting and continued use of food waste as pig feed.
2. Improving public awareness by providing simple, visual waste education accessible even to children who cannot attend school.
3. Introducing AI-based waste sorting technology through step-by-step implementation and international cooperation.

These solutions are expected to function effectively because they fit Kenya's economic conditions, agricultural environment, and existing waste habits.

2. Research Method

The research was conducted through online analysis of international articles, NGO reports, UN documents, and case studies from various countries. Waste management strategies from Singapore, the United States, Germany, and Kenya were compared to identify methods that could be adapted to Kenya.

This study also examined existing technologies such as composting systems and AI-based waste sorting machines, evaluating their feasibility in low-income environments from the

standpoint of cost, required infrastructure, and human resources.

3. Results and Discussion

3-1. Results

The research identified two major issues in Kenya:

1. Excessive Waste Volume

- Large amounts of organic waste (about 60% of total waste) accumulate in landfills such as the Dandora Dumpsite.
- Kenya already uses some food waste as pig feed, but the measure is insufficient due to population and waste growth.

2. Lack of Knowledge About Proper Disposal

- Many children cannot attend school, leading to inconsistent awareness about recycling and waste separation.
- Waste tends to accumulate in specific areas, but no systematic sorting or education is implemented.

3-2. Discussion

1. Reducing Waste Volume

The research suggests continuing the current system of feeding organic waste to pigs while adding:

- Low-cost compost systems in households and farms
- Local composting that uses Kenya's strong agricultural sector
- Reduction of organic waste before it reaches dumpsites

These proposals align with the U.S. "4R (Rot)" model and are realistic because composts can be built cheaply.

2. Improving Knowledge and Behavior

To address the educational gap:

- Schools should introduce waste education programs.
- For children not attending school, illustrations and visual instruction at local waste sites can ensure equal access to information.

This approach reflects the student advisor's suggestion that waste education must fit local communities rather than be standardized.

3. Introducing AI Sorting Technology

Advanced technology such as AI sorting machines is effective but costly.

Following innovation studies, the research proposes a step-by-step introduction:

1. Start with low-cost composts and education
2. Build a small-scale sorting center at major waste collection sites
3. Cooperate with developed countries for recycling and technical support

This gradual approach improves feasibility despite financial or language barriers.

4. Conclusion and Future Prospects

This research concludes that waste problems in developing countries require country-specific solutions, not a universal global method.

For Kenya, the following combined strategy is most effective:

- Promote composting and organic waste reduction
- Provide easy-to-understand, visual waste education
- Gradually introduce AI sorting technology with international cooperation

In the future, Kenya should strengthen community involvement in waste separation and expand compost use nationwide.

For researchers and policymakers, further studies on low-cost waste technologies and culturally adaptable educational programs will be essential.

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How can we produce medicine in developing countries?

～use of Vernonia amygdalina~

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Abstract

In the world, many people suffer and die from malaria. To solve this, it is necessary to distribute treatment medicines to developing countries. I focused on Nigeria, a country with a large population, and considered methods for producing medicine against malaria there. I propose distributing an extract from the leaves of the local plant, Vernonia amygdalina, as an alternative source of medicine.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

According to a UNICEF report, more than 1.5 million infants and young children die from pneumonia, diarrhea, and malaria. These diseases are treatable in developed countries, where appropriate medicines are readily available. In my research, I focused particularly on malaria, a disease for which treatment is still not sufficiently accessible in many regions. Malaria is prevalent in tropical and subtropical areas, and infection can progress to severe symptoms and even death. Globally, malaria accounts for 5% of deaths among children under five. Furthermore, 70% of children infected with malaria are unable to receive proper treatment.

1-2. Previous Research

According to *Current Perspectives on the Medicinal Potentials of Vernonia amygdalina Del.* (Ifeoma I. Ijeh and Chukwunonso E. C. C. Ejike), extracts of Vernonia amygdalina have been shown to possess antimalarial properties. In addition, Vernonia amygdalina is highly resistant to drying and has been traditionally used as a medicinal plant in many African regions. Based on these findings, I hypothesized that developing a medicine derived from Vernonia amygdalina could potentially help save children infected with malaria. However, because this plant has not been used as medicine, it is difficult to use it as official medicine.

1-3. Research Question (RQ)

Based on the situation described in Section 1–1, I recognized that we need to improve malaria treatment in Africa. Although importing medicines from developed countries is possible, the cost becomes significantly higher, making it difficult for those who need the medication to access it. Therefore, I considered local production of antimalarial drugs in Africa to be a more effective approach. For this reason, I formulated the research question for this study as: “How can antimalarial drugs be produced in developing countries?”

1-4. Hypothesis

I formulated the hypothesis that the extract of Vernonia amygdalina could be utilized as an antimalarial drug. As indicated in Previous Research, Vernonia amygdalina is considered to possess antimalarial properties, and because the plant is relatively easy to cultivate, it is regarded as a suitable candidate for use as an alternative source for medicine.

2. Research Method

First, I examined the regions where malaria is prevalent and compared them with the natural distribution of Vernonia amygdalina. From these areas, I selected a region suitable for the study and investigated what kinds of systems and facilities would be necessary to utilize Vernonia amygdalina as an alternative source of medicine in that location. At the same time, I also considered appropriate methods for distributing it.

3. Results and Discussion

3-1 Results

(1)According to the *World Malaria Report 2022*, Nigeria accounts for the highest proportion of both malaria cases and malaria-related deaths worldwide.

(2)The experiment cited in Previous Research used an ethanol extract, this study adopts water extraction, which is simpler and more feasible. When using water extraction, the leaves of Vernonia amygdalina can be processed simply by immersing them in boiling water. Since this method does not require specialized equipment, it is considered suitable for production in developing countries.

(3)The distribution method for the produced medicine draws inspiration from the traditional Japanese “Toyama Medicine Sellers” system. Its key feature is that medicines are delivered to households in advance, and payment is collected later based on the amount used.

3-2 Discussion

It is considered that the large number of malaria patients and malaria-related deaths in Nigeria is partly due to its large population. Therefore, this study first focuses on Nigeria, where the demand for malaria treatment is expected to be high, and proposes the cultivation of Vernonia amygdalina in the country.

Vernonia amygdalina is relatively easy to cultivate, making it suitable for growth in Africa. For cultivation, local labor should be utilized so that the plant can be produced in a self-sustaining manner. Malaria treatment often requires urgent action, and establishing hospitals in all areas is difficult. Therefore, distributing medicine through a household-based medicine distribution system is considered effective. If doctors regularly visit households to provide detailed medical examinations and collect payments at the same time, treatment could be carried out more efficiently.

4. Conclusion and Future Prospects

I propose cultivating Vernonia amygdalina and producing an antimalarial medicine by extracting its leaves with water, followed by distributing the medicine using a system similar to the traditional “Toyama Medicine Sellers” model. I believe that this approach would enable earlier treatment for malaria patients and help reduce mortality.

However, this study did not examine the detailed living conditions in Nigeria, which raises questions such as whether communities are concentrated enough for the proposed distribution method to be practical. In the future, I aim to address these issues and develop a system that is more closely aligned with the daily lives and needs of local residents.

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TFTA Project

～Let's Reduce the Number of Malnourished People～

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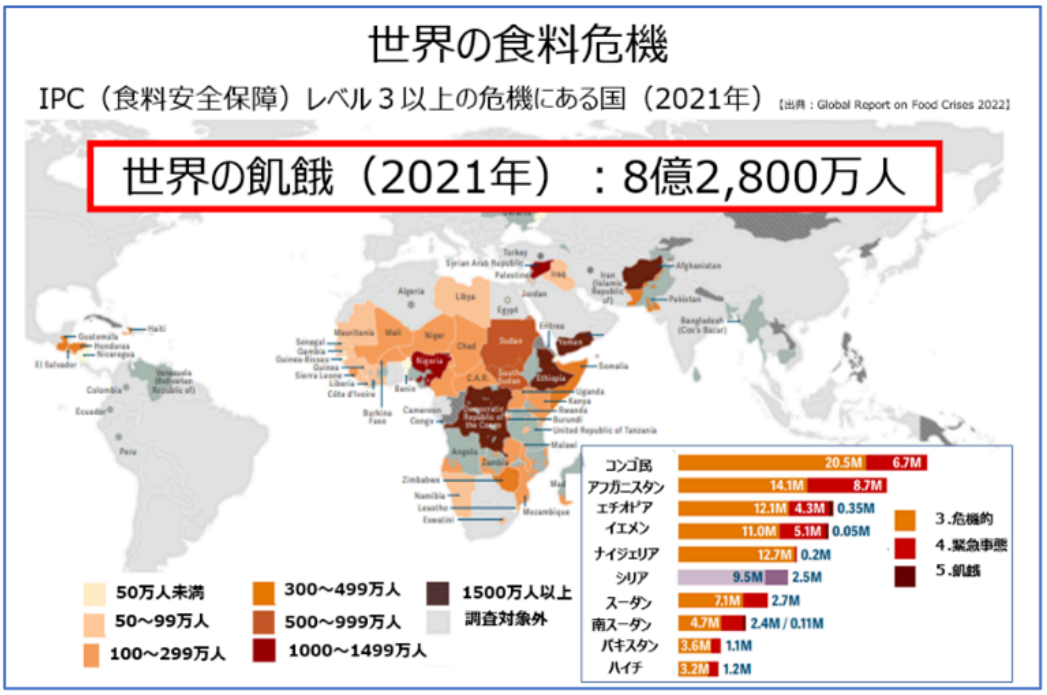
<Abstract> （研究の概要）

The world has a serious food problem, and solving it will make the world a better place.In this research, I focused on food problems caused by international trade and created an idea called the TFTA (Transport Food To Africa) Project.This plan aims to build a World Food Trade Organization that manages food distribution efficiently.Although the plan is still rough, I hope to develop it more and help solve world hunger.

1. Introduction (Background, Significance, and Purpose)

Today, the world faces a serious food problem.According to a 2018 survey, over 820 million people suffer from hunger—about one out of nine people.
Hunger does not happen because there isn't enough food.
The world produces about 2.4 billion tons of grain every year, which is almost twice what we need.I also became interested in this issue after listening to a lecture by Professor Oshidari, who worked for over 30 years at the United Nations World Food Programme (WFP) and helped people in areas hit by wars and disasters.Because of these reasons, I decided to research this topic.

The purpose of this study is to reduce the number of people who suffer from malnutrition.
People need enough nutrition to live and achieve their goals.
I want to help create a world where everyone can do what they want because they are healthy and well-fed.



1-1. Social Context (Current Situation and Problems)

More than 820 million people are hungry, and about 256 million of them live in Africa.
If this study can help reduce hunger even a little, it will have great meaning.
For example, people who overcome hunger can work, help their communities, and improve the economy.
Therefore, solving hunger can make the world a better place.

1-2. Previous Research

In the paper “Food Problems under Globalization” by Tetsu Shimoishikawa, the author discusses how globalization affects food distribution.
He says that although the world produces enough food, problems such as poor trade systems, lack of infrastructure, and poverty cause unfair distribution—especially in Africa.
His paper suggests improving trade policies and infrastructure, but it does not give detailed solutions.
Therefore, I tried to think of a more concrete plan to solve the food problem in Africa.

1-3. Research Question (RQ)

How can we solve food problems in Africa from a trade perspective?

1-4. Hypothesis

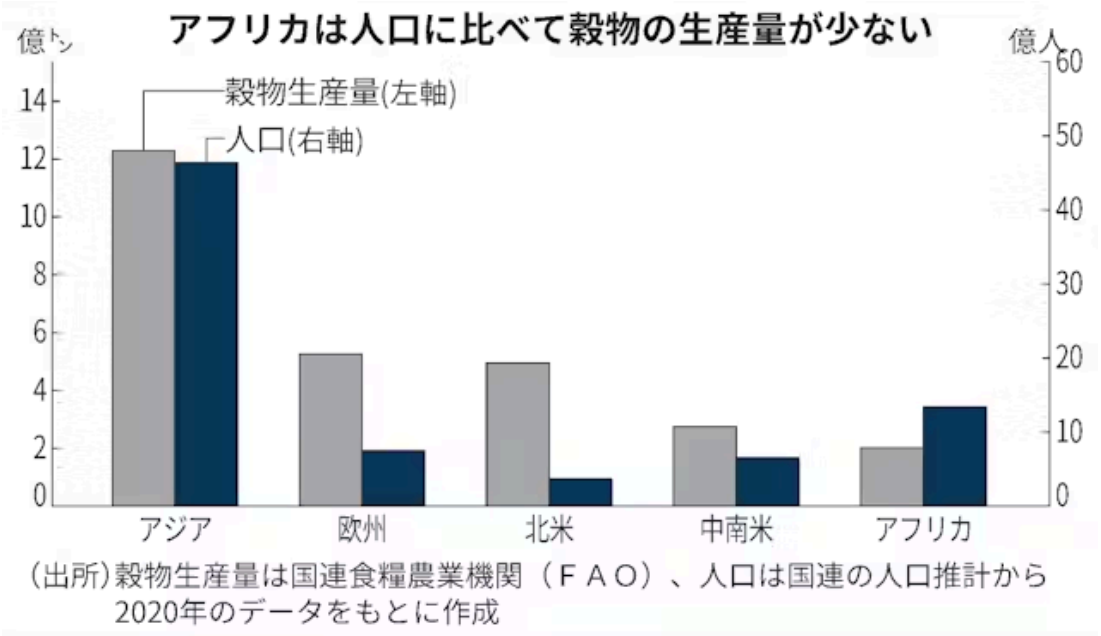
I think creating a global organization that manages food and trade will help distribute food more equally around the world.This could lead to the solution of food shortages.

2. Research Method

・I used the Internet to research the causes of Africa’s food problems.
・I analyzed which causes could realistically be solved.
・I thought about possible solutions to those causes.

3. Results and Discussion

3-1 Results（結果）
There are many causes of food problems in Africa
・Low production: Lack of technology and infrastructure makes it hard to produce enough food.
・Poor transportation: Roads and railways are not well developed, so food cannot be delivered easily.
・Economic inequality: Many African countries are poor and cannot buy food in international trade, so food prices rise.
・Climate change: Droughts and floods destroy crops.
Because solving all these causes is difficult, I focused on economic inequality and trade.



3-2 Discussion

My Proposal: The TFTA Project

I propose the TFTA (Transport Food To Africa) Project.
This project would create a World Food Trade Organization that manages global food distribution.
It would set a limit on how much food each country can import, so food can be shared fairly among all nations.
As mentioned earlier, the world produces twice as much food as we need.
If this food is distributed properly, hunger can be reduced.
In rich countries, large amounts of food are wasted, while in developing countries, people cannot afford food because prices rise.
By controlling global trade, we can make food more available for poor countries like those in Africa.

4. Conclusion and Future Prospects

To answer my research question—
“How can we solve food problems in Africa from a trade perspective?”

I propose to establish a World Food Trade Organization through the TFTA Project.
If this plan works, food will be distributed more efficiently, and poor countries will be able to buy food at lower prices.This will help solve hunger problems.
In the future, I want to study this idea more deeply and make the TFTA plan more detailed.
I also want to think about possible negative effects of creating such an organization and find ways to solve them.

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Protecting Endemic Species in Australia

Preservation from Wildfires

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Abstract

In Australia, wildfires occur frequently, and many animals are injured or killed by them, especially koalas. Leaves and branches of eucalyptus, koalas' food, contain the substance which inhibits germination. It will disappear by wildfires, and eucalyptus can germinate. So, reducing wildfires prevents koalas from becoming extinct and eucalyptus from germinating.
By researching past examples and current projects on the Internet , I found that installing fireproof sheets, using AI fire detection systems, and burning forests in consideration of eco-systems are effective ways to improve forest environments.
In the future, it will be necessary to consider the costs of these measures.

1. Introduction (Background, Significance, and Purpose)

・Background-Why are forest fires likely to occur in Australia?

One of the major background factors is the Indian Ocean Dipole (IOD). The IOD is a climate phenomenon in which, every few years from summer to winter, the sea surface temperature becomes relatively cooler in the eastern Indian Ocean and warmer in the western part. When this happens, the cooler areas tend to experience clearer skies, leading Australia to face high temperatures and dry conditions. In recent years, as global warming has progressed, the frequency of this phenomenon appears to be increasing.

Image 2: "Diagram of the Dipole Mode Phenomenon and Australian Bushfires" (Yahoo! Japan News)

・Significance

Koalas are listed as "Vulnerable (VU)" on the IUCN Red List and as "Endangered (EN)" on Australia's national red list. Currently, many koalas are suffering burns or dying due to frequent bushfires. However, simply reducing the number of bushfires can create another problem: eucalyptus trees, which are koalas' food source and habitat, cannot regenerate properly without occasional fire. As a result, eucalyptus populations may decline, which could indirectly contribute to the extinction of koalas.

Implementing fire-prevention measures that take forest ecosystems into account can help protect koalas. In addition, reducing bushfires lowers carbon dioxide emissions, which helps slow the progression of global warming. Furthermore, cooperation from local communities is essential for reducing bushfires. Preventing bushfires may also help strengthen connections among local residents.

- **Purpose**

The main purpose is to prevent the damage that bushfires cause to koalas. In addition, implementing the proposals from this study can help slow the progression of global warming and promote interaction among local residents.

1-1. Social Context (Current Situation and Problems)

- Current Situation

Australia is home to more than 1,300 endemic species, the highest number in the world. Many of these species are globally popular, and animals such as koalas and kangaroos have become symbols of Australia. However, a significant number of these animals are currently listed as endangered.

Several factors contribute to this situation, including habitat loss, invasive species, and extreme weather events. Among these, one of the major issues connected to both habitat loss and extreme weather is bushfires. In fact, during the large-scale bushfires that occurred between 2019 and 2020, media coverage not only emphasized the severity of the fires but also highlighted that many koalas suffered injuries such as burns or died. Even koalas that survived faced the risk of extinction due to the loss of their natural habitat.

Furthermore, when bushfires occur in Australia, large amounts of carbon dioxide are released, accelerating global warming. Since global warming is also one of the reasons behind the increase in recent bushfires in Australia, the occurrence of massive bushfires worsens global warming and increases the likelihood of further large-scale fires.

In this study, the focus is placed on koalas, which were severely affected by previous bushfires. This focus was chosen because it is estimated that the population of wild koalas decreased by 30% before and after the 2019 bushfires.

period	Estimated wild koala population
Before the bushfire (2018)	32,065 – 57,920
After the bushfire (2021)	45,745 – 82,170

↑Table1 :Changes in the Estimated Population of Wild Koalas in Australia

- **Problems Associated with the Extinction of Koalas**

If koalas were extinct, their predators, such as owls and dingos, would hunt and eat other animals. In other words, ecosystems in Australia forest would be destroyed.

Moreover, eucalyptus leaves wouldn’t decrease, and the balance of growing trees would change. Trees which can grow earlier would block out the sunlight, then other trees couldn’t

grow. So, there would be less diversity of forests.

1-2. Previous Research

The measures to reduce the damage by bushfires currently in Australia

During the large-scale bushfires that occurred between 2019 and 2020, it was found that some organizations rescued injured animals and attempted to return them to the wild. However, it was also revealed that some animals didn't survive the rehabilitation process before they could be released.

Currently, in Australia, measures taken to reduce the damage caused by bushfires include the establishment of firebreaks (Image 1) and issuing warnings and guidance to nearby residents. However, I felt that these measures alone are not sufficient to prevent injuries to endemic species before they occur.

←Image1 :firebelts

Fire-Resistant Sheets

When wildfires occurred in California, United States, there was a case in which the world's largest tree, the General Sherman Tree, was wrapped with aluminum fire-resistant sheets at its base to prevent it from catching fire. I thought that applying this method to eucalyptus trees could also be effective. However, because eucalyptus trees are a species that disperse their seeds through fire, using fireproof sheets may interfere with their ability to release seeds.

→Image2: the General Sherman Tree

AI fire detection system

The American company PanoAI has developed an AI fire-detection system that works in conjunction with satellites, and it has already begun to be used in places such as Ōarai Town in Ibaraki Prefecture and Hawaii.

In California, the system detected at least 1,200 fires over the past year, and data shows that about 30% of them were detected before 911 calls were made.

Satellite images are sent every 20 minutes, allowing the system to detect fires as small as 5 square meters.

I believe that introducing this AI fire-detection system in Australia would enable firefighters to extinguish fires while

they are still small. The cost is approximately 15 million yen (based on the case of Ōarai Town in Ibaraki Prefecture).

Image3: AI fire detection system by PanoAI

1-3. Research Question (RQ)

My first research question was: “What can we do to protect koalas in Australia before they get injured by wildfires?” When I looked at past cases, I found that most actions focused on helping koalas after they were injured, mainly from burns. But I thought that helping them after the damage happens is too late. We need to reduce the damage itself.

While researching, I learned that eucalyptus trees, which are koalas’ food and a place for them to sleep, need wildfires to grow. Their leaves and branches contain substances that stop seeds from growing. These substances disappear after wildfires, so the seeds can grow. Because eucalyptus is very important for koalas, we need to protect both at the same time. So I made a new research question: “How should we manage wildfires in Australia to balance koala protection and the regeneration of eucalyptus?”

1-4. Hypothesis

Introducing fireproof sheets, using AI fire detection systems, and carrying out cultural fire management are effective ways to improve forest environments. Cultural fire management means burning forests at the right time so as not to destroy eco-systems in forests.

- **About Cultural Fire Management by TIME**

According to the article,

1,At present, cultural fire management attracts as a strategy for managing bushfires. Cultural fire management involves lighting fires that are good for the land under controlled conditions to lower the risk of future hazards.

2,Cultural burning starts from taking a holistic approach with the understanding that everything is interconnected. Indigenous people in Australia call the relationship between people and nature “Kinship”, which means it is not only functional but also emotional. It requires a deep knowledge of plants, animals, climate, and topography. In addition, they define "seasons" based on changes in the natural environment.. For example, the start of winter in northern New South Wales is indicated by male lyrebirds singing.These are not the typical seasons: spring, summer, fall, and winter.

3,These days, cultural burning attracts the residents in Australia, and they participate in the workshop to learn the indigenous fire management. This conduct generates the value and the employment of indigenous people, and expands the circle of communication.

I regarded firebelts as an effective way to surpass wildfires. A firebelt is a cleared area to prevent the spread of fire. However, firebelts may connect to deforestation. Cultural fire management doesn’t destroy forests. So, for this reason, I adopted cultural fire management as an effective way to prevent wildfires instead of firebelts.

2. Research Method

To develop my hypothesis, I used websites of protecting organizations, investigating reports, and academic papers and reports that I found through Google Scholar. As the main basis for my hypothesis, I utilized online articles such as The New York Times and TIME, and to test my hypothesis, I used academic papers that I found through Google Scholar.

3. Results and Discussion

- **Results**

About the impact on carrying out the cultural burning in the habitat of koalas

The NESP Project 8.4.5 developed a practical framework to guide fire management for koala conservation. The report emphasizes that fire strongly shapes eucalyptus forests, which provide koalas with food and shelter. The quality of koala habitat depends on factors such as fire frequency, fire intensity and the season in which fire occurs. Low intensity or appropriately timed burns can maintain forest structure and promote healthy eucalyptus growth. In contrast, frequent or severe fires can reduce the availability of preferred food trees, remove canopy cover and decrease habitat suitability over the long term.

The framework outlines actions that managers can take before, during and after fire to protect koala habitat. Before fire, maintaining suitable fire intervals helps preserve mature eucalyptus stands. During fire, protecting key habitat patches is essential for koala survival. The report concludes that coordinated fire management that reflects ecological needs and cultural knowledge is essential for ensuring suitable habitat and long term persistence of koala populations.

- **Discussion**

The report indicated that conducting appropriate planned burns in advance can help protect koala habitat. Consistent with the hypothesis, cultural fire management appears to be an effective method for safeguarding koalas from the impacts of wildfire, without hindering the regeneration of eucalyptus forests.

4. Conclusion and Future Prospects

I found that installing fireproof sheets, using AI fire detection systems, and burning forests in consideration of eco-systems are effective ways to improve forest environments. It not only preserves organisms and plants in Australia, especially koalas and eucalyptus, but also gives people the opportunities to communicate with others.

In the future, it will be necessary to consider the costs of these measures. In addition, I want to create a system to start and continue these plans.

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Child Abuse in Developed Countries (Ages 0–6)

～From Reducing Parental Burden to Prevention～

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【Child Abuse in Developed Countries (Ages 0–6)】　　5306 Okawara Atsuki

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

The number of child abuse consultations in Japan in 2022 has increased to approximately 220,000 cases, about three times the number from ten years ago. This reflects an increased burden on each child due to changes in the social environment. It also indicates a positive shift in society's perception of child abuse, but it highlights that minor forms of abuse, previously overlooked, are now coming to light. Therefore, I felt it necessary to prevent and detect such emerging child abuse early to resolve it. Having researched child-rearing during FEWC Ⅰ , I applied this perspective to child abuse. Given the global scope of this research, I focused on developed nations with living standards and customs similar to Japan's. I specifically limited the age range to 0-6 years old, as Japan has the highest number of abuse cases in this age group (45% of all cases in 2022). Furthermore, I determined that targeting this age group is more effective for prevention than for early detection after abuse occurs, leading me to finalize this research theme.

1-2. Previous Research

Orange Ribbon Campaign (Japan)

Used as a symbol for preventing child abuse. Orange is used to represent the hope for children's bright futures. However, overseas it is not used as a symbol for child abuse prevention, but rather as a symbol for ADHD awareness and the eradication of racial discrimination. November is Child Abuse Prevention Promotion Month in Japan.

Neuvora (Finland)

A publicly operated “Birth and Childcare Family Support Center” providing support from pregnancy through the child's preschool years.

Offered free to all households as a universal health insurance service.

99.8% of pregnant women in Finland use it; it's common practice to visit Neuvora first upon becoming pregnant.

Typically, one public health nurse provides support, supplemented by psychologists, midwives, etc., as needed.

Services for families facing difficulties are also well-established.

*Finland's VAT is 24%. Implementing the same system in Japan would likely be challenging.

1-3. Research Question (RQ)

How to reduce parental burdens to fundamentally prevent child abuse (ages 0–6) in developed countries

1-4. Hypothesis

Hypothesis 1

Could changes in the number of abuse cases and age trends in developed countries be similar to those in Japan?

Hypothesis 2

Could the number of abuse cases vary depending on parental income?

Hypothesis 3:
Could abuse be more frequently perpetrated by fathers?

【Child Abuse in Developed Countries (Ages 0–6)】 5306 Okawara Atsuki

2. Research Method

Primarily through internet searches (comparing both Japanese and international sites)
Identify the causes of abuse and determine proposed solutions based on them.
List the necessary elements for initiatives based on the results of the established hypotheses.

3. Results and Discussion

3-1 Results

1,The current trend in Japan shows a gradual increase in the number of abuse cases. Regarding the proportion of abuse consultations, psychological abuse is the highest at 55.3%, followed by physical abuse at 25.2%. Neglect accounts for a low percentage.

In the United States, the rate of child abuse victims per 1,000 children is gradually decreasing. Compared to Japan, the percentage of neglect is overwhelmingly high at 76.0% (total 114.1%), and the percentage of sexual abuse is also high. Conversely, psychological abuse is very low at 6.4%.

In the UK, the reported child abuse rate per 1,000 children has remained largely flat over five years. Neglect accounts for about 50%, followed by psychological abuse at nearly 40%.

In Australia, psychological abuse accounts for 56.9%, followed by neglect at 20.6%.

Note: Japan's high rate of psychological abuse stems from its classification of “witnessing domestic violence” as psychological abuse. This results in psychological abuse constituting the majority of cases compared to Western developed nations. Therefore, Japan's data may not be suitable for direct comparison.

2,The specific relationship between annual income and the number of abuse cases was unclear, but it appears to be linked to abuse. Considering factors such as economic poverty (33%) and unstable employment (16%) cited as household circumstances, along with the higher incidence of abuse in single-parent households, it is generally expected that lower parental income leads to poverty, and this lack of financial leeway increases the likelihood of abuse.

3,According to 2019 statistics from child guidance centers, the primary perpetrators of abuse

were biological mothers at 48% and biological fathers at 41%, showing no significant difference.

In contrast, among crimes related to abuse prosecuted by the National Police Agency, biological mothers accounted for 27% and biological fathers for 45%. While fathers were more numerous, the results did not show a significant imbalance.

3-2 Discussion

Why does child abuse occur in the first place?
1. Issues faced by the child
2. Issues faced by the parents
3. Issues that change within the home and family
Broadly speaking, these can be divided into these three categories.
Since the target children's age range is 0-6 years old, the focus is on enabling solutions to the problems faced by parents and families.

For children aged 0-6, it is difficult for them to act independently once abuse occurs, so preparing a protective environment is expected to be the primary countermeasure.
Hypothesis and Test 1: Since abuse patterns vary significantly by country, implementing universal countermeasures for abuse prevention worldwide is likely to be challenging in many aspects.
Hypothesis and Test 2: It is anticipated that financial strain in low-income households often contributes to abuse, suggesting support for such families is necessary.
Hypothesis and Test 3: It is unlikely that abuse stems solely from one parent (father or mother). Support from both parental perspectives is therefore necessary.

Support should be provided to economically struggling families. Additionally, initiatives should be considered for other families to reduce burdens from both the father's and mother's perspectives.

【Child Abuse in Developed Countries (Ages 0–6)】 5306 Okawara Atsuki

4. Conclusion and Future Prospects

1. Review of the Child Benefit System
Current Benefit System
Up to high school age, no income restrictions → Countermeasure against declining birthrate
For those with a certain level of income, the effect of benefits in preventing a declining birthrate is likely minimal.
In fact, a survey of 2,615 people conducted by Zexy Baby found that only 36% of parents responded that benefits would encourage them to have a second or subsequent child.

Shouldn't support be targeted more toward lower-income families and single-parent households by implementing income restrictions or limits based on the number of children?
This approach would also be more effective in preventing child abuse.

2. Happy Contact: Smartphone App for Parent Collaboration

Features
・Task list showing real-time household chores and progress
Reduces family conflicts by showing unfinished tasks and clarifying responsibilities

・A shared calendar for schedules
Reduces forgotten schedule updates and enables smoother coordination between partners.

・A needs list for missing items
Allows either partner to easily see what's needed when going out, enabling purchases on the way to work or elsewhere, reducing unnecessary shopping trips.

・Child growth records and observations
Recording child development and sharing small joys allows both parents to experience a sense of accomplishment.
Also enables immediate response if the child shows signs of distress.

Increasing dual-income households make childcare coordination difficult → Create a more coordinated marital relationship through the app

3. Launching the Orange Ribbon Movement Globally (Though not directly aligned with the theme of reducing parental burden...)
Recognizing that solving abuse globally through identical initiatives is difficult, I felt this could strengthen fundamental societal awareness. Thus, I considered expanding the Orange Ribbon movement worldwide.

Regarding the benefit system, I feel there is a complex aspect where it's difficult to say definitively what should be done, as other issues like the declining birthrate and aging population are also involved. Regarding parental support, we need to consider not only coordination but also other support methods like childcare services. However, there are many challenges in implementing this, such as the associated costs and establishing the necessary systems. Furthermore, for parents who already have underlying issues, the support mentioned above is likely to be less effective than for those facing fatigue from childcare. We must continue to consider not only prevention, such as coordination with the police and aftercare for abused children, but also early detection and response in case of emergencies.

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急増する児童虐待―その社会的な背景を探る | nippon.com

Utilizing Surplus Renewable Energy for Microbial Methanation

A Global Model for CO_2 Recycling

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Abstract （研究の概要）

This study proposes methane gas production utilizing archaea and surplus renewable electricity. In many countries, renewable energy is underutilized and often goes to waste. Materials called metal-organic frameworks (MOFs) capture carbon dioxide, while microorganisms known as methanogenic archaea convert carbon dioxide and hydrogen into methane. This study suggests the method could significantly contribute to carbon dioxide reduction and clean energy storage. However, improvements are needed regarding the reaction rate of the archaea and the efficiency of the MOFs.

1. Introduction (Background, Significance, and Purpose)

Many developed countries currently produce large amounts of renewable energy. At times, this energy becomes surplus electricity that goes unused. Meanwhile, the world needs to reduce CO_2 emissions and improve clean energy storage methods. The objective of this study is to verify whether surplus renewable electricity can be converted into methane using CO_2 capture technology and microorganisms.

1-1. Social Context (Current Situation and Problems)

In countries such as the United States, Germany, Japan, and China, renewable energy generation often exceeds demand. This surplus electricity is going to waste. Furthermore, global CO_2 emissions remain high, and current energy storage systems are inadequate. Therefore, a system is needed that can store surplus electricity while simultaneously reducing CO_2 emissions.

1-2. Previous Research

Previous research has revealed several key points: MOF materials can capture CO_2 at low energy. “Power-to-gas” systems can convert electricity into hydrogen or methane. Archaea can convert CO_2 and hydrogen into methane. However, few studies have integrated these three ideas into a single model utilizing renewable energy. Furthermore, challenges remain, including the slow reaction rate of archaea and the need for additional power supply.

1-3. Research Question (RQ)

To what extent can additional renewable electricity generated using MOF (metal-organic framework) and microbial methane production technology contribute to building a sustainable carbon recycling system?

1-4. Hypothesis

Using surplus renewable electricity to produce hydrogen, and combining this hydrogen with CO_2 recovered by MOFs, allows archaea to generate methane at a practical scale. This

hypothesis is supported by prior research demonstrating highly efficient CO_2 recovery via MOFs and stable methane production by archaea.

2. Research Method

This study employed a theoretical model. The scope was limited to the United States. First, based on publicly available energy reports, the sample amount of additional renewable electricity was set at 24.45 terawatt-hours (TWh) per year. Next, the amount of methane that could be produced by reacting hydrogen manufactured using this electricity with CO_2 captured by MOFs was estimated. Subsequently, factors such as reaction rates were considered using data from prior research on archaea. Finally, this model was compared with other studies on Power-to-Gas and CO_2 capture.

3. Results and Discussion

3-1 Results（結果）

According to this model, the surplus electricity of 24.45 terawatt-hours can produce large amounts of hydrogen, sufficient to support methanogenesis by archaea. This study also demonstrates that the energy required for MOFs to capture CO_2 is minimal. Under favorable conditions, archaea can convert CO_2 and hydrogen into methane. Since many countries possess comparable levels of surplus renewable energy, this model is applicable across extensive regions.

3-2 Discussion（考察）

This approach suggests potential for establishing a carbon-neutral energy cycle. While this concept supports the hypothesis, improvements in microbial reaction rates and system design are necessary. This model resembles power-to-gas systems but holds potential for reducing energy losses through microbial utilization. Other studies suggest that MOF performance and bioreactor design are critical for practical implementation. A bioreactor is a device that uses microorganisms or cells to produce useful substances.

4. Conclusion and Future Prospects

This study concludes that combining CO_2 capture technology with methanation processes using archaea can contribute to building useful carbon recycling systems by utilizing surplus renewable electricity. Currently unused electricity can become a stable fuel source while achieving CO_2 reduction. Future research should focus on enhancing archaeal reaction rates, optimizing metal-organic frameworks (MOFs), and improving bioreactor design. This concept holds the potential to be a significant step toward realizing a cleaner global energy system.

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Bringing the world’s urban development to Japan

Toward revitalizing the new town

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Abstract

The New Town was constructed during a period of rapid economic growth in Japan. It is often destroying the greenery and environment of the suburbs in metropolitan areas during the construction process. Then while examining initiatives overseas and the specific circumstances of each city, seeking effective solutions.

1. Introduction (Background, Significance, and Purpose)

I like to research and travel in Japan's cities. It is evolving or degrading cities' environment and convenience. Also, it has begun developing the New Town around there. New Town is a city that was recently constructed in what is considered cities' environment and convenience. Therefore, I think that New Town's redevelopment. Is this a good idea to pursue more cities' environment and convenience? And is this a good idea to use as a reference technique to develop the cities abroad?

1-1. Social Context (Current Situation and Problems)

New Town was constructed for the purpose of curbing the concentration of population and resources in metropolitans and establishing a good environment. Japan's major New Towns are Senri(Osaka), Tama(Tokyo), and Kōzōji(Aichi). They are named Japan's Three Great New Towns. They have backgrounds that were constructed in the High Economic Growth Period. However, in the process of building cities, it is destroyed by the environment in metropolitans. I can't say it's not environmentally conscious. I think the New Town needs to prepare measures equivalent to the lost environment in the process of building New Town.

1-2. Previous Research

I found one paper as recorded in 1997. It is written about when it was developed in Tama New Town in Tokyo. It is said that it will destroy the Tama City Suburbs' greenery and environment about agricultural land and forests. I think that it is not a good process. As a result, Tama New Town can coexist with greenry. However, it has a bad background. We need to be more careful during redevelopment.

1-3. Research Question (RQ)

My Research Question is "In what situation is it necessary to redevelop Japanese cities?" Is the environment the cause? Or is the building deteriorating? I will resolve this question.

1-4. Hypothesis

I formulate a hypothesis. That is, it is a good way to use it as a reference to overseas skills. In America and Britain, national agencies decided to provide stable life for the worker: a dwelling surrounded by greenery, formland, and housing. It can improve workers' lives. However, it is very difficult for Japan to incorporate these policies. So I will focus on donating a life rich in greenery. By this, I derive the Research Question answer that the city lacks a life rich in greenery.

2. Research Method

First, I decided on a place to research the redevelopment of New Town. That place is Ryugasaki(ibaraki), and Inzai(Chiba). They are New Towns, the Tokyo urban area. Ryugasaki New Town was constructed beginning in 1981. It has the most population of all of Japan's New Towns. Commuting to the metropolitan area is also good. Inzai New Town (It is also known as Chiba New Town. However, in this paper, I call it Inzai New Town.) was constructed beginning in 1966. It is spreading to three cities: Funabashi, Inzai, and Shiroi cities. This New Town is near a Tokyo metropolitan area and highly populated. So I focused on these two New Towns.

I researched three things: the manufacturing process and current environmental issues, how to improve this New Towns' unique strengths, and specific redevelopment plans. Please refer to these, I will compare two New Towns, with other New Towns, and abroad towns.

3. Results and Discussion

①The manufacturing process and current environmental issues

1. Ryugasaki New Town (Ibaraki) and Inba New Town (Chiba)

These cities' numbers can't be large, but it has a minimum. Such cities have a full greenery area in the suburbs. This New Town was constructed by utilizing the suburbs. So I guess it will be cut out and constructed around the urban area.

②How to improve this New Towns' unique strengths

1. Ryugasaki New Town (Ibaraki)

Ryugasaki City, in Ibaraki, has 70,000 people. It ranks 339th in Japan's city population rankings. This rank is about halfway overall. This New Town has the most population in Japan. This is an undeniable strength. And it was constructed in Northern Kanto, so sufficiently distant from urban areas. It can solve the problem of overcrowding in metropolitan areas.

2. Inba New Town (Chiba)

As mentioned above, this New Town spans three cities, Funabashi, Inzai, and Shiroi cities in Chiba. The population of each city is 650,000 people (Funabashi, 21th), 110,000 people (Inzai, 233th), 61,000 people (Shiroi, 404th). The total is about 850,000 people. This rivals Saga prefecture. It is a good access for metropolitan and urban areas, and the airport (Narita National Airport). We can go there only one train by this New Town there.

③Specific redevelopment plans

I think that they are missing the greenery and environment. Originally both, the more greenery area because they located on the suburbs for the metropolitan area. I think that we need to implement policies to restore greenery.

3-1 Results

I came to understand that some New Towns in Japan were constructed at the expense of the environment in suburban areas. However, being in the suburbs, it is a good access for metropolitan areas. Then I will try to compare and contrast two New Towns, Ryugasaki and Inba. However, they are in a similar current situation and facing problems.

3-2 Discussion

I think it needs to reclaim the lost greenery during the development process. So I will adopt initiatives from overseas, about Green Belt. It is a space where plants are planted that are surrounded by the metropolitan area, incorporating British Cities (London, Manchester, and Birmingham) and America, Maryland province (Green Belt City). I think that it is within the scope of feasibility in Japan.

4. Conclusion and Future Prospects

My final conclusion is that it is already in a state requiring redevelopment in Japan's New Town, so it needs to restore lost greenery to urban suburban areas. That is my Research Question's answer. Specifically, utilizing the overseas initiative known as "Green Belt" is an effective solution. Next to the future prospects. I need to research and solve elements requiring redevelopment. For example, building deterioration. These New Towns were constructed about 60 years ago. It is becoming increasingly dilapidated. And to deepen my understanding, I want to visit two New Towns, Ryugasaki and Inba. Then I want to research accessibility and connectivity to metropolitan areas, environmental conditions and the state of building deterioration.

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Coexistence between Generative AI and Humans

How Image-Generating AI and Illustrators Can Share Their Roles

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Abstract

This study looks at how image-generating AI and human illustrators can work together. I suggest that illustrators make the rough sketch and drawing, while image-generating AI does the coloring. This way, we can respect copyright and make good use of AI at the same time. However, even if using a similar coloring style does not break copyright law, it is sometimes considered taboo in the illustration world. This remains an issue to think about.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

In recent years, we often hear about generative AI. Since ChatGPT was released in November 2022, many people have started using AI tools. Big companies like Google also created their own, such as Gemini. Generative AI can write, translate, answer questions, make illustrations, and organize data very quickly. It helps us save time and work more efficiently. But as AI develops, many new problems are appearing. According to Japan's Ministry of Internal Affairs and Communications, the global market for generative AI will grow to over 120 billion USD by 2027. Because of this fast growth, we need to solve AI-related problems soon. In this study, I focus on the problem of image-generating AI.

1-2. Previous Research

In 2024, Ryunosuke Oshima from Takarazuka University wrote a paper about how image-generating AI and illustrators can coexist.
He suggested that AI could make rough sketches — the first step in creating an idea — to help artists start their work more easily.
However, he also said that it is difficult to study the real effects, because people's art styles and opinions about AI are very different. So it is still unclear if true coexistence is possible.

1-3. Research Question (RQ)

Today, people can make illustrations easily by typing prompts into image-generating AI. Because of this, many AI-generated images appear on social media. Some people worry that human illustrators may lose their jobs or positions. So, my research question is: "Besides having AI make rough sketches, is there another way for illustrators to coexist with image-generating AI without losing their place?"

1-4. Hypothesis

The earlier study suggested that AI can make rough sketches, and humans can do the rest. But since AI learns from existing artworks, it might accidentally copy a similar composition or idea, which could lead to copyright problems. Therefore, I suggest the opposite: humans should make the rough sketch and drawing, and AI should do the coloring. This may help avoid copyright issues and allow illustrators and AI to work together.

2. Research Method

I looked at previous studies about coexistence between illustrators and image-generating AI.
I also searched for real examples of AI being used in illustration, and studied how copyright applies to coloring.
Then I summarized and discussed the results.

3. Results and Discussion

I found that there are already AI tools for coloring, such as CoPainter and Petalica Paint. When I searched the Internet, “AI coloring illustration” had about 18,100 results, while “AI rough sketch illustration” had about 2,080 results — about nine times more. This shows that people are more interested in using AI for coloring than for sketching. Also, copyright law protects concrete expressions in art, not ideas like color schemes. So using AI for coloring does not break copyright law.

4. Conclusion and Future Prospects

In conclusion, my hypothesis seems correct. AI coloring has more interest and demand, and it does not violate copyright. So, illustrators and AI can coexist in this way. However, even if it is not illegal, making colors that look too similar to someone else’s work is still considered taboo in the art world. We need to think about how to solve this issue in the future. Although this study focused on illustration, generative AI is growing in many other areas too. I would like to continue researching AI and its relationship with people.

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【論文タイトル】 5310Kawano-1

Save the children from the malnutrition

～how to popularize liquid formula in developing countries～

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【論文タイトル】 5310Kawano-2

Abstract
Malnutrition and infection are severe issues caused by preparing powdered formula with dirty water in developing countries. Liquid formula is sterile but becomes unhygienic when poured into a separate, uncleaned bottle. The hypothesis is to ensure safety, we must redesign the container. The goal is to develop a truly ready-to-feed container that eliminates the need for external bottles or attachments, which are impossible to sterilize in poor environments.
The conclusion is Focusing on an innovative container design is the most practical and scalable solution to safely deliver nutrition and solve the hygiene problem where it matters most, unlike expensive hospital systems or simple education. This product innovation makes the sterile liquid formula accessible and safe until consumption.

1. Introduction (Background, Significance, and Purpose)

According to the research of the United Nations, 35% of the children were killed by malnutrition. They get nutrition by drinking their mother's breast milk or powdered milk. However, it is difficult for children to get nutrition for two reasons. First, some of them have different biological and adoptive parents, so they can't get breast milk. Second, making powdered milk has many steps to complete and it needs clean water. Some of the developing countries use dirty water to make milk and many children suffer from infections and diseases.

I think this problem is serious and I want to contribute to saving them from malnutrition. If we can decrease the number of children who suffer from hunger, we may be able to protect our future.

1-1. Social Context (Current Situation and Problems)

The social and health crisis is deeply rooted in the conflict between necessity and hygiene. The preparation of powdered infant formula, which requires clean water, often becomes a vehicle for germs transmission when only contaminated sources are available. This practice compromises the integrity of the nutrition and leads to infectious diseases. Although liquid formula is sterilized, its utility is severely restricted by the necessity of auxiliary feeding equipment (bottles or separate attachments costing roughly 500 JPY), which demands a clean environment for sterilization that is typically nonexistent in the target communities. This systemic failure to provide a truly ready-to-use product is the focal point of this study.

1-2. Previous Research

According to market research company Euromonitor, as shown in the graph below, the penetration rate in Europe and the United States is high in Finland at 92%. Also, according to research by Mizuno Tomomi, Nishimura Miho, and Tokuda Katsumi of the University of Tsukuba and Tokyo Future University, the penetration rate of liquid milk in Japan is 38%, and in South Korea it is 11%, indicating that it has not yet become widespread in countries outside of Europe and the United States.

To investigate the sales status of liquid milk in Japan, inquiries were made to five domestic companies manufacturing powdered milk. Meiji, Morinaga, Glico, and Snow Brand Beanstalk

also manufactured liquid milk, but Wakodo did not produce it. When asked about overseas sales, none of the companies were selling liquid milk abroad. The reason given by all companies was that “overseas markets have strict regulations, with different standards for raw materials and nutritional value in each country.” Furthermore, the four companies producing liquid milk use different containers. Regarding this point, it was found that each had specific reasons: cans were chosen because “they can be stored at room temperature for long periods,” paper cartons because “they are lightweight and easy to dispose of,” and pouches because “they are slim and convenient for carrying.” However, there are two issues with using liquid milk. The first is the necessity of transferring the liquid milk into a baby bottle.
Second, when feeding directly, an attachment costing around 500 yen per unit is required. Both methods necessitate a clean environment, making the use of liquid milk in developing countries challenging due to hygiene concerns during feeding.

1-3. Research Question (RQ)

How can we make safe and convenient liquid milk more widely available in developing countries?

The most crucial aspect of this research is ensuring that children receive nutritious food safely and hygienically. Liquid milk already guarantees safety and nutritional value, making it more valuable than powdered milk prepared on-site. However, if its cleanliness is compromised during transfer, the inherent benefits of liquid milk are lost. For the health and safety of children, we concluded that focusing on the liquid milk containers and developing improvement plans is the most essential step.

1-4. Hypothesis

Assuming the nutritional value of liquid formula is guaranteed, the focus is on the container itself to avoid risks like infection when transferring liquid formula to another container. The goal is to develop a container that allows liquid formula to be consumed directly.

2. Research Method

Search the internet for literature supporting last year's research, analyze it, verify hypotheses, and summarize the results.

3. Results and Discussion

3-1 Results

This report references the final report of the feasibility study conducted by the joint venture of Mita Rika Kogyo Co., Ltd. and Waseda Soken Initiative Co., Ltd., titled “Feasibility Study for the Introduction of a Hospital-Based Equipment System for Safe and Secure Breastfeeding for Infants Hospitalized in Obstetrics (NICU) and Pediatrics in Vietnam: Final Report.” Vietnam, despite its economic growth, faces disparities in pediatric healthcare. Neonatal deaths (under 28 days old) constitute a significant proportion of the under-five mortality rate. Infectious diseases are a primary cause, and the report emphasized that hygienic management of the milk preparation process for infants in NICUs is crucial for reducing this risk. The WHO also warns about the risk of powdered formula being contaminated with dangerous bacteria. In Vietnam, it was revealed that bottles are recycled without adequate cleaning and sterilization, and that tap water, which is not properly sterilized, is used. Additionally, improper management practices were observed, such as failing to rapidly cool prepared formula and storing it at room temperature for extended periods. This study introduced a comprehensive formula preparation equipment system meeting the high hygiene standards cultivated in Japanese hospitals. This system was confirmed to have high adaptability in major obstetrics and gynecology/pediatrics departments in Vietnam. A two-step strategy was outlined to actually introduce Japanese technology into Vietnam. Step 1 involves inviting local doctors and nurses to Japan for training, instructing them on system operation and hygiene management awareness. Step 2 aims to obtain health insurance approval and introduce the equipment to hospitals nationwide. This will significantly reduce the rate of hospital-acquired infections among hospitalized infants and contribute to shorter hospital stays. It will also improve the hospitals' hygiene management level and enhance the quality of medical care.

This study was carried out in Palermo, Italy, focusing on 24 city-run childcare centers. The main goal was to check how well parents and childcare workers followed important health rules—like those from the World Health Organization (WHO)—when preparing powdered infant formula (PIF). Researchers also wanted to see if people knew that powdered formula is not actually sterile.

The findings were quite concerning. Most people surveyed believed the formula was safe when they bought it: 73.2% of parents and 84.4% of childcare workers mistakenly thought the powdered formula was "sterile."

Because of this wrong idea, people didn't follow the proper steps. For example, they thought they didn't need to use boiling water to mix the formula. This is a big problem because using cool water allows germs that might be in the powder to survive.

In a separate survey of 131 parents, very few people were safe: only 11% followed all four key safety rules recommended by the WHO (like sterilizing bottles, using the correct water

temperature, and properly throwing away leftovers). This shows that the correct, safe information about preparing formulas is not reaching people effectively.

Finally, the study pointed out a challenge: while the WHO suggests using water above 70°C, this might not kill all germs, and using hotter water could change the formula's nutrients or be hard for families to do at home. Therefore, the researchers stressed that improving safety requires two things: giving people better knowledge about the risks and offering ongoing training on safe preparation methods.

3-2 Discussion

The main solution suggested in the Vietnam study—bringing in a complete, high-tech system for making milk—is effective, but it is limited to hospitals because it costs a lot of money and is hard to install everywhere. This solution doesn't fix the bigger, common problem of unsafe milk preparation happening in people's homes or small non-hospital settings, which the Italian survey highlighted.The main point of this study is that even though liquid formula is very safe and easy to use (unlike powdered formula), it immediately becomes unsafe the moment it is poured into a separate baby bottle.All the liquid formula packaging sold today (cans, cartons, pouches) require you to pour the milk into a clean bottle or buy an expensive special part (about 500 JPY) to feed the baby directly. In poor areas or places without proper sanitation—which is exactly where we want to help—it is almost impossible to find a sterile bottle or to keep the special part clean. The hygiene problem simply moves from the step of mixing the milk to the step of cleaning the feeding equipment.Our idea to focus on developing a container that can be used for feeding directly is proven to be the most necessary step. If the liquid formula package itself can work as a feeding bottle (so you don't need separate bottles or tools that need cleaning), the formula stays safe and clean right until the baby drinks it. This is how we can truly solve the problem of "necessity and hygiene" by providing a product that is truly ready-to-use and avoids contact with dirty hands or water.In short, while teaching people (education) and using high-tech systems (like in Vietnam) are helpful, the most practical and scalable way to help developing countries is to invent a better product design that removes the hygiene risks of transferring milk and cleaning equipment. This will allow us to safely and cleanly deliver nutritious food to children.

4. Conclusion and Future Prospects

To ensure this solution does not burden developed nations and can be easily distributed across wide areas, it is necessary to develop a design that is cheaper, lighter, and more durable. Furthermore, it would be beneficial to conduct field tests in developing countries to gather feedback on usability and hygiene conditions. Additionally, it is important for countries to build cooperative relationships so that, alongside distributing liquid milk, they can also provide education to raise citizens' literacy levels.

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Medical Supplies Shortage in Developing Countries

～focusing on vaccine ,medical supplies and international support~

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Abstract （研究の概要）

A few years ago, COVID-19 swept the world and caused the healthcare system to collapse. Looking at other developed countries such as Europe and the US, the medical situation became very severe . Not only developing countries but also developed countries had numerous damages. I refer to academic papers and the internet. Developing countries need medical supplies especially medicine and medical masks.

1-1. Social Context (Current Situation)

Several years ago, after COVID-19 was first discovered in Wuhan, China, it spread rapidly across the globe and triggered a worldwide pandemic. Japan was no exception, and society fell into great confusion. The most serious disruption was probably in the distribution of goods. Daily necessities sold out everywhere. Factories were forced to shut down, production stopped, and supplies nearly disappeared.

The same situation occurred in medical settings. COVID-19 patients were brought to hospitals one after another, but there was a severe shortage of medical supplies. I heard that items such as masks, gowns (protective clothing), and face shields were in short supply, forcing medical workers to substitute them with other materials.

What about overseas? In developing countries such as those in Africa, organizations like the Japan Committee for UNICEF have been transporting relief supplies. In other words, developing countries lack sufficient medical supplies. In addition, they also suffer from a shortage of medical equipment. (Medical supplies are consumable items, while medical equipment refers to advanced machinery.)

According to a paper by Takuji Date, “Medical equipment in developing countries is often not used appropriately due to inadequate maintenance and management systems, insufficient knowledge among healthcare workers who use the equipment, or lack of budget, which has become a serious problem.” In many cases, medical equipment cannot be adequately provided, or even when it is available, it is not used effectively.

Therefore, in this paper, I decided to focus on and consider the spread of medical equipment in developing countries.

1-2. Previous Research

Takuji Date, “A Study on the Sustainable Operation of Medical Equipment in Developing Countries”

This paper examines the gap between developing countries and developed countries, focusing on the problems that exist in developing countries, and discusses international efforts to address these issues. It also identifies areas in which these efforts can be improved.

According to Date's paper, "Medical equipment in developing countries is often not used appropriately due to inadequate maintenance and management technologies, insufficient knowledge among healthcare workers who operate the equipment, or lack of budget, and this has become a serious problem.

1-3. Research Question (RQ)

I set the following research question: *What is necessary to improve the availability of medical supplies in developing countries, and what kinds of medical supplies are needed?*
In developing countries, many deaths occur as a result of people being unable to receive appropriate medical care. For example, many people live using unsanitary water, which leads to preventable illnesses and deaths. In addition, even when people contract infectious diseases that can be treated in developed countries, they are often unable to receive treatment due to a lack of medicine. As a result, their conditions worsen, and in the worst cases, they lose their lives.

Such situations continue to occur in developing countries. Although these deaths could be prevented, many people still die. In order to improve this situation, even to a small extent, I established this research question.

This study mainly focuses on developing countries in Asia. However, information on medical supplies in developing countries outside Asia will also be collected as necessary.

1-4. Hypothesis

As a hypothesis, although developed countries have sent relief supplies to developing countries, these supplies have already been used up, resulting in a shortage of medical supplies and a weak healthcare system. In addition, transportation infrastructure such as land transportation is underdeveloped in many developing countries, making it difficult to distribute supplies effectively. As a result, medical systems in inland areas have deteriorated.

Furthermore, some countries or their neighboring countries are in a state of conflict, which prevents them from allocating sufficient resources to the supply of medical materials. These factors are considered to be possible explanations for the shortage of medical supplies. It is also thought that a lack of national financial resources contributes to the low standard of healthcare.

2. Research Method

As a method for testing the hypothesis, previous cases of medical supply assistance will be examined through academic literature and internet sources. By understanding the frequency of aid and the types of supplies provided, it will be possible to identify where medical supplies are needed and what kinds of supplies are in demand. This information can then be used to inform future proposals.

In addition, other academic papers will be reviewed in order to identify points that must be taken into consideration and to obtain the latest information, which will contribute to the effectiveness of this research.

3. Results and Discussion

It was found that UNICEF had previously provided medical supply assistance to Nigeria. According to UNICEF's official website, on April 16, 2020, COVID-19–related medical supplies were transported to Nigeria by aircraft. These supplies included 10,000 testing kits, 15 oxygen concentrators, personal protective equipment (PPE), vaccines, and emergency medical kits.

Based on this case, the hypothesis that shortages of medical supplies in developing countries are caused by underdeveloped land transportation networks can no longer be strongly supported. Since supplies can be delivered directly to specific locations by air, the method of transportation itself does not appear to be a major issue that requires further consideration.

As another example, UNICEF also provided medical supply assistance to Bangladesh. On September 6 of the same year, medical supplies worth approximately 12.28 million US dollars were sent to Bangladesh as part of its COVID-19 response. The supplies sent were similar to those provided to Nigeria, with additional items such as N95 masks (medical masks), ventilators, and pulse oximeters.

Based on these cases, the types of medical supplies that are lacking in developing countries can be considered. However, one concern is that this assistance was specifically intended to address COVID-19, which means that the types of medical supplies provided were largely predetermined. Medical supplies that are generally considered necessary include vaccines and testing kits to combat infectious diseases, as well as masks and gowns to protect the lives of healthcare workers.

In developing countries, the mortality rate of children under five years old is high. Major causes of death include diseases such as pneumonia, diarrhea, malaria, and measles, many of which can be prevented or treated through vaccination. Therefore, vaccines are expected to contribute significantly to reducing infant and child mortality rates.

4. Conclusion and Future Prospects

In conclusion, vaccines and testing kits for the prevention of infectious diseases are the medical supplies most urgently needed in developing countries. In addition, consumable items such as masks are also essential. To improve the availability of medical supplies, it is necessary either for developing countries to become able to produce medical supplies domestically or to achieve sufficient financial capacity to secure them through trade with other countries. However, it is unlikely that either of these solutions can be realized in the near future.

Efforts to overcome both individual poverty and national poverty, as well as external support to assist these efforts, may be an important first step toward achieving this goal. Another major issue is how to secure the funds needed to provide assistance. Large amounts of money are required for any form of support. Although this approach relies on external help, collecting donations through NPOs and NGOs is a realistic option. While a single donation may be insufficient, contributions from thousands or even tens of thousands of people could have the power to significantly improve medical conditions.

As noted in Date's paper, a lack of education and personnel among healthcare workers, as well as the absence of hospitals near residential areas, are also factors contributing to low medical standards. Although this study focused on medical supplies, future research will consider human resources and the establishment of medical facilities.

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The economic impact of sports in developing countries

Community development through a professional soccer team

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Abstract

In order to create and improve new economic cycles in developing countries, we used South Sudan as an example to create a professional soccer league and examine how a new economic cycle can be created while developing sustainable cities.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

Currently, there are many sports leagues in developed countries, and Japan has a variety of leagues, including the J.League and WE League in soccer, the B.League and W.League in basketball, and the Central and Pacific Leagues in baseball. Professional sports are supported by funding from a variety of sources, including spectators, sponsors, infrastructure such as venues, and, in Japan, bets on the outcome of sports lotteries such as Toto and Winner. By introducing these systems to developing countries and economically underdeveloped regions, we believe we can achieve two goals: establishing a new economic cycle and revitalizing local communities. Furthermore, we believe that strengthening the federations of sports leagues in each country and introducing exchange student programs could also lead to an improvement in the level of sports.

1-2. Previous Research

In order to revive the economies of developing countries, economic circulation needs to be more diverse than just temporary. I found a paper on the effects of sporting events on host communities. The paper cited positive economic impacts, such as employment, infrastructure development and improvement, and increased investment. However, negative aspects, such as rising prices, construction costs, congestion, and social problems, were also cited. This study only considers short-term sporting events such as the Olympics and the World Cup, but I would like to investigate whether the same or different effects can be achieved when a league is established.

1-3. Research Question (RQ)

1. What is the economic impact of sports in developing countries? Can it create a new economic cycle?
2. Will sports exchange programs improve the level of sports and the degree of contribution to local communities?

In order to narrow the scope of this study, the research was conducted with South Sudan in mind.South Sudan's current FIFA world ranking on November 20, 2025 is 168th out of 210

countries and regions. So, future developments are easy to understand.South Sudan will continue to develop.

1-4. Hypothesis

The aforementioned previous study, "The Effects of Sport Events on Host Communities," used the 2019 Rugby World Cup, the 2020 Tokyo Olympics, and the 2021 Kansai World Masters as examples to examine the economic impacts of events based on their structure. First, regarding economic impacts, positive effects were observed, including employment impacts, infrastructure development and improvement, and increased investment. However, negative effects were also identified, including price increases, construction costs, congestion, and social issues. Second, regarding social impacts, positive effects were primarily cultural development, improved awareness and image, new opportunities, and increased interest in different cultures. Negative effects included increased traffic congestion, higher crime rates, and increased prostitution. Third, regarding environmental impacts, positive effects included motivating people to protect the environment and historical buildings, promoting environmental education, conserving resources and ecosystems, and improving the environment for sustainable development. Negative effects included environmental destruction.

Regarding economic impacts, the study found that establishing a year-round league would promote employment and infrastructure development.

2. Research Method

First, we will investigate the economic situation in the Republic of South Sudan. Then, we will consider the conditions for establishing a league while comparing it with the current situation and referring to previous research. Regarding infrastructure development, we will make a selection and consider options, referring to the J.League and the top five European leagues.

3. Results and Discussion

3-1 Results

South Sudan's GDP in 2023 is expected to be US$7,178 million, ranking 154th out of 193 countries. The country only gained independence in 2011. While specific statistics are not available, we learned from the NPO Rocinantes' activity reports and other websites that soccer is popular in Sudan, so we hypothesized the establishment of a soccer league. Currently, South Sudan does not have a soccer league like Japan or Europe, and the Juba National Stadium in the capital, Juba, has a capacity of approximately 6,000. We also learned that the water coverage rate is significantly low, at only 2% nationwide.

What specific jobs could be created in terms of employment? We expect to create jobs in a variety of areas, including match management, stadium maintenance, infrastructure development, equipment management, and administrative and government coordination. As previous research suggests, a soccer league would require more maintenance, management, and expansion than a temporary event, making it more economically effective than a temporary event.

3-2 Discussion

We considered creating a new soccer league in South Sudan as a way to create a new economic cycle. However, given the current circumstances, it would be difficult to establish one immediately, and we felt it was necessary to create a soccer league while promoting reconstruction and urban development. We believe that first, by developing transportation systems such as roads and railways, it would increase movement from east to west, north to south. Furthermore, when building a stadium, a stadium that can only be used for soccer has limited uses. Therefore, we believe that it would be worth building a stadium if it had a water supply system, a roof, and could be used as a shelter in the event of civil war, or if the spectator seats could be used as an educational institution for children. Furthermore, we believe that employment can be created in a variety of areas, including stadium management, team staff, and construction workers.

4. Conclusion and Future Prospects

This time, we were unable to research how international study abroad in sports can improve the level of the sport. We believe that the first priority should be improving the city's infrastructure and establishing a league. Therefore, we have considered and summarized the criteria for establishing a league.
First, we will make it a league with no promotion or relegation to attract funds. We will also create around 10 teams, mainly in the capital, Juba, and have them join the league. Sponsors for each club will have to derive more than half of their sponsorship income from domestic companies or companies with branches or factories within the country, which will help develop the domestic economy. We will also aim to improve the level of the league by having each club take the lead in building a stadium with a capacity of approximately 5,000 people and abolishing the limit on foreign players, which will promote the development of the associated infrastructure.

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Health Promotion Through Sports

~Building Healthy Societies in Developed Nations~

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Abstract

Lifestyle-related diseases have become a serious social issue in many developed countries, largely due to insufficient physical activity caused by modern work styles and rapid technological development. In Japan, national data show that although many people express interest in improving their exercise habits, a large portion do not intend to take action, mainly because they feel they lack time due to work and other responsibilities. At the same time, lifestyle-related diseases continue to increase globally, and more than 1.4 billion people are considered physically inactive according to WHO standards.

To address this issue, this research focuses on the working-age population (approximately 35–60 years old) and examines how sports-based business models can promote sustainable exercise habits in daily life. Through an analysis of existing initiatives—such as the Japanese "Sports Yell Company" system, ASICS' corporate wellness programs, and TANITA's health-monitoring approach—this study identifies both successful practices and challenges, especially the low participation rate in corporate health programs.

The research establishes two main questions: "What types of sports initiatives are most effective for preventing lifestyle-related diseases?" and "What kinds of sports are easy to continue for busy workers?" Based on data on exercise intensity and life-expectancy benefits, sports such as tennis are highlighted for their effectiveness due to their full-body movement and cognitive engagement.

The study aims to develop an original corporate Health White Paper proposing how companies can integrate exercise opportunities into work schedules. Future research will involve gathering opinions from employees, examining available sports facilities, and exploring practical methods for implementing sports programs in real workplaces.

1. Introduction (Background, Significance, and Purpose)

In recent years, lifestyle-related diseases have become a growing concern in many developed countries. These diseases are strongly linked to modern lifestyles, including long working hours, lack of physical activity, and rapid technological development. Although many people understand the importance of exercise, they often struggle to maintain healthy habits because of limited time and fatigue. As a result, the number of people suffering from lifestyle-related diseases continues to increase, creating a serious social problem.

This research focuses on the working-age population, who are especially affected by busy schedules and stress. By examining existing sports-related initiatives by companies and organizations, this study aims to clarify what kind of sports programs are effective and how they can be integrated into daily life. The purpose of this research is to explore how sports-based business models can promote sustainable exercise habits, prevent lifestyle-related diseases, and contribute to a healthier society in developed nations.

1-1. Social Context (Current Situation and Problems)

In many developed countries, people's lifestyles have changed dramatically due to globalization, technological advancement, and the spread of sedentary work environments. As a result, physical activity has decreased, and lifestyle-related diseases such as diabetes, hypertension, and obesity have become more common. In Japan, national data show that although many people express interest in improving their exercise habits, the largest group

answered that they have “no intention to change,” mainly because they feel too busy with work, housework, or childcare.

Furthermore, WHO data indicate that more than 1.4 billion people worldwide are physically inactive. This lack of activity increases the risk of chronic diseases and shortens healthy life expectancy. At the same time, the number of medical professionals is insufficient in many countries, meaning that preventive solutions—such as regular physical activity—are becoming even more important.

However, many existing corporate health programs have low participation rates. Even when companies provide exercise opportunities, workers often cannot join because the activities are held outside working hours or require extra motivation and time. These issues show the need for workplace environments and company policies that make physical activity easier, more accessible, and more integrated into daily routines. This research responds to these social problems by investigating what sports programs are most effective and how companies can support employees in maintaining healthy exercise habits.

1-2. Previous Research

Several previous studies and corporate initiatives have provided important insights for this research. The first example is the Japanese “Sports Yell Company” program, which recognizes companies that actively promote sports participation among employees. Companies are certified based on clear and company-wide efforts, such as morning exercise sessions, sports events, or the use of health devices. This initiative shows that organizational policies can encourage employees to be more active.

The second example is the wellness program developed by ASICS, a major sports equipment company. ASICS has been certified as a Sports Yell Company for seven consecutive years and has established its own health management policies. These include sports events, seminars, and awareness programs aimed at improving both physical and mental health. Their approach demonstrates how consistent, structured programs can support healthier lifestyles.

The third example is TANITA, a company known for its health-monitoring devices. TANITA makes use of its own measurement technology to visualize employees’ physical conditions, helping them set clear goals and monitor progress. This “visualization” strategy supports employee motivation and leads to effective health management.

Although these initiatives show positive outcomes, participation rates often remain around 50%. This suggests that even well-designed programs may be difficult to join unless they are convenient and fit workers’ schedules. These findings highlight the need for sports programs that all employees can realistically continue.

1-3. Research Question (RQ)

Lifestyle-related diseases are strongly connected to daily habits such as diet, physical activity, rest, smoking, and alcohol consumption. Among these factors, lack of physical activity plays a major role. Establishing regular exercise habits can help reduce obesity and lower the risk of many chronic diseases. Based on this understanding, this study focuses on how to incorporate sustainable exercise into daily life, especially for busy workers.

The main research questions are as follows:

1. What types of sports initiatives are most effective in preventing and improving lifestyle-related diseases?
2. Which sports are easy for busy workers to continue on a long-term basis?
3. How can companies create time and opportunities for employees to exercise during their work schedules?

These questions guide the analysis and support the development of a practical sports-based business model that companies can implement.

1-4. Hypothesis

Based on existing data and previous research, this study proposes two main hypotheses related to the types of sports that are suitable for working adults and how companies should support exercise habits.

Hypothesis 1: Sports with appropriate intensity and full-body movement are most effective.

Sports such as tennis, swimming, and running require moderate to high exercise intensity and engage multiple muscle groups. Data on life-expectancy benefits show that tennis, in particular, is associated with the longest extension of healthy life expectancy. This may be due to its full-body movement, social interaction, and high cognitive engagement. Therefore, tennis is hypothesized to be one of the most effective sports for preventing lifestyle-related diseases.

Hypothesis 2: Exercise is more sustainable when integrated into the company schedule.

Even if companies offer exercise programs, employees may not participate if the activities occur outside working hours. Based on overseas research, programs are more effective when physical activity is built into the daily routine. Therefore, it is hypothesized that incorporating exercise time into working hours will significantly improve participation and continuity.

These hypotheses form the foundation for designing a corporate Health White Paper that proposes practical, sustainable ways for companies to support employee health.

2. Research Method

This research was conducted by analyzing previous studies, national health data, and corporate wellness initiatives. First, relevant statistics on exercise habits, lifestyle-related diseases, and physical inactivity were collected from government reports, international organizations, and medical institutions. These data helped clarify the current challenges faced by working adults.

Next, three examples of corporate health programs—Sports Yell Company, ASICS, and TANITA—were examined to identify their strengths and limitations. By comparing these initiatives, the research explored which approaches were effective and which factors prevented wider participation.

Additionally, the study incorporated opinions from people working in companies. Their comments were used to better understand barriers to exercise, such as lack of time, fatigue, and difficulty maintaining motivation. Information about sports facilities in Japan, including their number and locations, was also collected to evaluate whether proposed programs could realistically be implemented.

Based on these findings, this research aimed to design an original “Health White Paper” that

companies could use to promote employee health through sports.

3. Results and Discussion

3-1 Results

The analysis of company-led sports programs and existing case studies produced three main findings.

(1) Short, low-burden programs had the highest participation rate.
Workers were more willing to join activities that required only 5–15 minutes, such as stretching sessions, light aerobic exercises, or walking meetings. These programs fit easily into busy work schedules and did not require special skills or equipment.

(2) Programs connected to daily routines were more sustainable.
Activities built into the workday—such as exercise breaks, step-count challenges, or office-wide wellness goals—were continued for longer periods compared to optional programs after work. Workers said that exercise felt “easier to start” when it was part of the workplace environment.

(3) Social and motivational elements increased long-term engagement.
Programs that included peer support, group participation, or app-based feedback encouraged employees to continue exercising. Many participants said that receiving encouragement or competing with coworkers made the program enjoyable and motivating.

These results suggest that successful sports programs share three features:
short, routine-based, and socially supported.

3-2 Discussion

The results highlight several important points about promoting physical activity among working adults in developed countries.
First, the high participation in short programs indicates that time is one of the biggest barriers preventing exercise. Workers with busy schedules often feel they cannot commit to long workouts. Therefore, companies should focus on providing accessible, low-burden activities that people can complete without stress. This supports previous research showing that even small amounts of daily exercise can improve health and productivity.Second, the success of routine-based programs emphasizes the importance of environment over motivation. Many people fail to maintain exercise habits because they rely only on personal willpower. When exercise is integrated into the workplace routine, the need for extra motivation decreases. This suggests that changing the structure of the workday may be more effective than simply encouraging employees to “try harder.”Finally, social and motivational elements played an important role in helping workers continue sports activities. Humans naturally enjoy shared goals and group support. Programs that include teamwork, encouragement, or friendly competition make exercise feel fun rather than obligatory. This aligns with psychological studies showing that social factors strongly influence habit formation.
Overall, the findings suggest that companies can play a key role in preventing lifestyle-related

diseases by creating environments where physical activity naturally fits into daily work life. Business models that combine short activities, routine integration, and social motivation may be most effective for building a healthier society in developed countries.

4. Conclusion and Future Prospects

This study showed that promoting exercise among working adults requires more than simply offering sports activities. Effective sports programs must meet two conditions:

(1) The activities should have strong health benefits, such as full-body movement and cognitive engagement.

(2) The activities must be built into the work schedule so that employees can participate without feeling burdened.

Tennis and other full-body sports appear to be strong options for workplace programs. The research also highlighted the importance of company policies, organizational support, and well-designed environments in promoting regular physical activity.

For future research, several steps are planned. First, further data will be collected by participating in actual health programs and interviewing employees and experts. Second, more detailed analysis of sports facilities will be conducted to determine how companies can access or utilize them. Finally, the proposed corporate “Health White Paper” will be developed by combining participation rates, health data, and practical implementation strategies.

Through this research, the goal is to contribute to healthier lifestyles, reduce lifestyle-related diseases, and support the long-term development of the sports industry.

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AI-based Optimization for Easier Dental Visits

～How can we increase the number of people coming for dental treatment and dental checkups?～

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Abstract

This research is about how to use AI to make it easier for people to go to dental clinics.

I mainly use the Internet to research based on overseas papers, etc. Instead of thinking about specific system development, we will study what kind of system we want to make and how AI can be used.

1. Introduction

This research aims to propose and verify a process for applying AI technology to the pre-treatment process, allowing patients to provide oral information (e.g., medical interviews and photographs) in advance at home, enabling a faster and more detailed symptom assessment and treatment plan determination during their first visit to the dental clinic.

This will significantly reduce the number of visits and the total time required before treatment can begin, thereby reducing the burden on patients and contributing to improved access to dental care.

1-1. Social Context

In modern society, the burden of multiple dental visits during the dental treatment process (initial consultation, examination, diagnosis explanation, treatment initiation, etc.) is a major factor in patients delaying consultations or discontinuing treatment. Reducing this time and psychological burden and improving access to dental care is an urgent issue. Meanwhile, artificial intelligence (AI) technology, which has seen remarkable development in recent years, is expanding the possibilities for diagnostic support in the medical field, particularly in image diagnosis and data analysis.

1-2. Previous Research

AI achieves high-precision diagnosis with dental image analysis and facilitates early detection of tooth decay, periodontal disease, etc. It was shown to improve treatment planning in a wide range of dental areas and significantly improve operational efficiency by automating management tasks.

AI is integrated into dental care, and deep learning improves diagnostic accuracy, improves treatment plans, and automates management tasks to increase operational efficiency. This has great potential in a wide range of fields.

1-3. Research Question

How can we increase the number of people coming for dental treatment and dental checkups?

1-4. Hypothesis

Reduce the burden of patients going to the hospital: Reduce the number of visits required before the start of treatment. Especially when surgery or complex treatment is required, advance preparation and information increase the possibility of starting treatment immediately on the day of your visit.

Reduction of waiting time and efficiency: Prior information organization and diagnosis support through AI shortens the time it takes for dentists to examine and diagnose, and improves the efficiency of the clinic as a whole.

2. Research Method

internet and papers

3. Results and Discussion

3-1 Results

Phase 1: AI pre-questioning at home

Patients access dedicated AI systems through devices such as smartphones and tablets.

Detailed questioning and symptom input: Enter the main complaint, past history, current severity of pain, etc.

Take and upload photos of the oral cavity: Follow the AI guide and take multiple photos of the oral cavity, including the affected area, at the indicated angle, and upload them to the system.

Initial analysis by AI: AI analyzes the possibility of tooth decay, periodontal disease, and other lesions based on the input questionnaire information and image data.

Phase 2: Diagnostic support and treatment plan with AI

The system compares the data obtained in phase 1 with the past case database and generates the following information in advance that is useful for the dentist's examination.

Narrowing down and prioritizing symptoms: Presenting likely diseases and high-urgent symptoms.

Presenting preliminary treatment options: Presenting a standard treatment for the estimated symptoms and presenting an initial view of the need for surgery.

Automatic creation of pre-examination forms and diagnosis support materials: Automatic

creation of detailed pre-examination reports for dentists to refer to.

Phase 3: Integrated diagnosis and immediate treatment plan decision at the time of hospital visit

When a patient visits a dental clinic, the dentist proceeds with the following steps.

Confirmation of AI reports and imaging diagnosis: Refer to the report created by AI in advance, and based on it, quickly carry out oral examination and detailed examination as needed. Use the AI diagnostic support function to reduce the diagnosis time.

Presenting a definitive diagnosis and a final treatment plan: Integrate preliminary information of AI with the results of a detailed examination by a dentist to make a definitive diagnosis. If treatment including surgery is required, present a detailed treatment plan, cost, and risk to the patient at this point and obtain consent.

Decision to start treatment: The patient can decide whether to start treatment (or surgery) on the same day based on prior information and explanation at the time of visit. This makes it possible to integrate "first visit for diagnosis" and "re-visit for the start of treatment".

3-2 Discussion

There is a limit to the image quality and angle of oral photos taken at home, and the initial diagnosis of AI is only an auxiliary. The dentist is responsible for the final diagnosis and treatment. In this regard, it is essential to disclose appropriate information to patients. And strict data protection and security measures are essential for the online handling of delicate medical information. In addition, it is required to develop clear guidelines for the legal positioning of remote information collection and AI diagnostic support.

4. Conclusion and Future Prospects

The "pre-dental treatment process optimization model using AI" proposed in this study combines AI screening at the patient's home with rapid diagnosis and treatment plan decision when visiting the hospital, significantly reducing the time and number of visits to the hospital until the start of treatment. It has the potential to reduce the burden on patients.

In the future, by further improving the diagnostic accuracy of AI, ensuring data security, and responding to relevant laws and regulations, this model is expected to greatly contribute to the efficiency of dental care and patient satisfaction.

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How to provide elementary education in Sub-Saharan

～To utilize open education～

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Abstract

It is estimated that over 60 million children worldwide lack access to primary education. Therefore, I focus on the educational movement known as open education, which aims to enable everyone globally to access high-quality educational experiences and resources. I examine methods for promoting primary education, particularly in Sub-Saharan Africa where many children remain out of school. Raising awareness of open education is a key priority. Furthermore, prior research indicates that open education can provide educational opportunities even to those facing economic or geographical barriers, offering lifelong benefits. It has been found to be an effective means of learning tailored to the individual progress of each learner. This suggests that providing educational opportunities in Sub-Saharan Africa is feasible, and the effectiveness of such efforts is expected to gradually increase. A key challenge moving forward is to understand what types of OER local communities would find most meaningful for education, in order to increase awareness of open education.

1. Introduction (Background, Significance, and Purpose)

In 2021, over 300 million children aged 5 to 17, equivalent to one in five people can't go to school. Also, one-fifth of children aged 5 to 17 haven't attended school ever, two-fifth of them haven't graduated from elementary school (UNICEF,2018). As a main reason, factors include poverty, illness, and war within a country or household. While attending school is not the only way to receive an education, it is a fact that these circumstances deprive people of educational opportunities. We must devise new approaches to overcome such situations.

1-1. Social Context (Current Situation and Problems)

Since last year, I have been conducting research on children unable to attend school. When broadening my perspective to the global stage, I learned that educational delays are quite severe in the Sub-Saharan region. Given the significant disadvantages stemming from a lack of education, this research focuses specifically on this issue.

1-2. Previous Research

Educating Out-of-School Children in North Western Nigeria through Open Schooling: A Case for Using Mobile Technologies - International Journal of Research and Innovation in Social Science

This study proposes leveraging mobile technology to enhance the effectiveness of Nigeria's Open School Initiative for its 13 million out-of-school children. It references open education, prompting me to consider whether any analogies can be drawn to my own research.

1-3. Research Question (RQ)

In sub-Saharan Africa, internet penetration rates are relatively high, yet primary education completion rates tend to be low. Reasons for this include the fact that, due to delayed development, there was no need to abolish old systems, making it easier for governments to adopt the internet; and the widespread belief among parents that it is better for children to work than to receive an education. Here, I set the research question as “How can open education be used to promote primary education?”

1-4. Hypothesis

One reason for the low primary school enrollment rate in sub-Saharan Africa is a cycle where children who missed out on education become parents themselves. They often cannot secure jobs paying enough to stabilize their livelihoods, leading them into poverty. This poverty then leads them to believe it is better to put their own children to work rather than send them to school. However, since some countries have relatively high internet penetration rates, open education remains an effective means of providing educational opportunities even for those not attending school. To promote primary education, it is therefore necessary to address the challenge of low awareness surrounding open education. Resolving this issue is expected to bring the solution to this research question into view.

2. Research Method

First, I researched open education in detail. According to Open Education: How Open Education is Transforming Higher Education and Lifelong Learning (Shigeta, 2016), open education refers to activities that utilize networks and technologies like the internet to make educational opportunities more accessible. Furthermore, even if individuals face various difficult circumstances such as economic or geographical factors that prevent them from attending school or university, they can still pursue learning in various academic fields and receive professional education free of charge. This allows them to satisfy their intellectual curiosity while gaining specialized knowledge that can lead to employment.

In other words, even in regions where formal schooling is underdeveloped but the internet is accessible, knowledge relevant to employment can be provided. Looking at internet penetration rates in Sub-Saharan Africa, many countries have rates between 30% and 70%, suggesting a certain level of effectiveness can be expected. Therefore, we will examine what initiatives are necessary to raise awareness of open education.

3. Results and Discussion

3-1 Results

Open Education: How Open Education Transforms Higher Education and Lifelong Learning (Shigeta, 2016) suggests that the effects promoted by open education can be broadly categorized into three areas: “curriculum accumulation,” “educational improvement,” and “lifelong learning.” Among these, “lifelong learning” refers to providing opportunities for internet-based lifelong learning using OER (Open Educational Resources—educational materials made publicly available online for educational purposes by individuals or organizations with expertise, not limited to schools or universities). For example, even after graduating from high school or university, or when facing various difficult circumstances such as economic or geographical factors that prevent attending school or university, individuals can still engage in learning across various academic fields and receive professional education free of charge. This allows them to satisfy their intellectual curiosity while acquiring specialized knowledge that can lead to employment.Furthermore, OPEN EDUCATION FOR EVERYONE ~New Education for Everyone~ (Nakamura, 2023) identifies the following teaching formats and learning methods enabled by the online and digital nature of open education, which is almost always delivered via the internet:

・Blended learning
・Face-to-face learning
・Classes combining e-learning
・Flipped classroom
・Classes where lectures (knowledge input) are done online as preparation, while face-to-face sessions focus on exercises and discussions (knowledge output)
・Adaptive learning

3-2 Discussion

When reconsidering the research question of this study—“How can open education be used to expand access to primary education?”—based on both studies, it becomes clear that raising awareness of open education was a priority for addressing this issue. The volume of OER available online increases daily, and our opportunities to encounter them are also growing. This trend itself can be considered a factor contributing to increased awareness. Based on Shigeta's research, OER can provide educational opportunities even for those facing various difficult circumstances, such as economic or geographical constraints, enabling learning across diverse academic fields and access to professional education. Furthermore, Nakamura's research suggests that open education serves as an effective means for personalized learning tailored to individual learners' academic progress. Given that the internet is reasonably widespread in Sub-Saharan Africa, providing learning opportunities through OER is not an overly difficult problem and is a sufficiently effective means to address the challenge.

4. Conclusion and Future Prospects

From the above, open education can provide education that benefits individuals throughout their lives, even for children unable to receive primary education due to various difficult circumstances such as economic and geographical factors. Given the internet penetration rate in Sub-Saharan Africa, it is also possible to use materials as OER. The variety and volume of OER are increasing daily, further aiding in addressing the challenges of this research. Here, the conclusion regarding the research question is as follows:
The increasing availability of OER and the personalized learning enabled by open education make it possible to provide educational opportunities in Sub-Saharan, and the effectiveness of this approach is expected to gradually increase.

Furthermore, as a future challenge, since this conclusion does not directly address raising awareness, I must first consider what types of OER would help local stakeholders more readily recognize their educational value in order to increase awareness of open education.

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Beyond Technology: A Human-Centric Approach to Energy Saving

～Integrating Nudge Theory, Trust, and Social Equity

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Abstract
This research investigates how society can effectively save energy using Information Technology (IT). While renewable energy is clean, its supply can be unstable, making consumer energy-saving essential. Through a literature review of European smart city policies and behavioral economics, I found that technology alone is insufficient. Successful systems require three elements: (1) "Smart Rewards" that combine financial incentives with psychological "nudges," (2) strict data privacy rules to build public trust, similar to European standards, and (3) support systems for low-income households. This paper proposes an inclusive energy data ecosystem that balances technological efficiency with social equity and trust.

1. Introduction

1-1. Social Context (Current Situation and Problems) Currently, the world is shifting toward renewable energy sources like solar and wind power to combat climate change. However, these clean energy sources are often unstable because they depend on the weather. Therefore, it is becoming increasingly important not only to generate energy but also to control how people consume it. While IT technologies like "Smart Meters" are spreading, simply installing devices does not automatically lead to energy-saving behavior.

1-2. Previous Research Previous research has focused heavily on hardware development, such as efficient batteries and smart grids. However, studies on "Smart Cities" in Europe suggest that technology cannot function without the cooperation of citizens. Some researchers point out that without clear benefits or trust in data handling, people are reluctant to share their energy usage data. This indicates a gap between technological capability and social acceptance.

1-3. Research Question (RQ) This research addresses the following question: **To promote energy saving using IT effectively, what social rules and psychological systems are necessary beyond just technology?** This question is significant because Japan needs a system that not only saves power but is also trusted and used by all citizens.

1-4. Hypothesis I hypothesize that to make IT-based energy saving successful, we need a "human-centric" approach. Specifically, this involves adopting **"Nudge Theory"** (psychological prompts) to encourage behavior change without forcing it, and establishing strict privacy rules to ensure safety. Furthermore, I believe a fair system must include support for low-income groups who may struggle with digital costs.

2. Research Method

To answer the research question, I conducted a qualitative literature review. First, I analyzed reports on smart city projects in Europe (specifically the EU's emphasis on GDPR) and the US to understand global trends in energy data usage. Second, I studied the concept of "Nudge Theory" in behavioral economics to find non-monetary ways to influence behavior. Finally, I applied "Innovation Theory" (specifically Ecosystem and Design Thinking) to structure a proposal for the Japanese context, verifying how these concepts can address issues like privacy and inequality.

3. Results and Discussion

3-1 Results（結果）Through the research, three key facts were identified:

1. **The European Approach:** Europe emphasizes "Digital Sovereignty." They believe that strict rules protecting personal data (like GDPR) are the foundation of innovation. Without high-level privacy protection, citizens do not trust digital services.
2. **Limitations of Money:** Financial incentives alone have limits. Research shows that people often respond better to social comparisons (e.g., "You used less energy than your average neighbor") than small monetary savings.
3. **The Digital Divide:** High-tech energy solutions often exclude low-income households who cannot afford smart appliances or EVs, creating an "energy inequality."

3-2 Discussion（考察）Based on the results, I propose a comprehensive system that integrates technology, psychology, and ethics.

- **Trust and Rules:** The reason Europe prioritizes rules is that they view data privacy as a fundamental human right. Japan should adopt a similar stance. If users know their data is legally protected and only used for energy saving, they will participate more actively.
- **Defining "Smart Rewards" and Nudges:** "Smart Rewards" should not just be about electricity price discounts. We should apply **Nudge Theory**. For example, setting energy-saving modes as the "default" (opt-out system) is a powerful nudge. Also, gamification—earning points or visualizing contribution to the environment—can motivate people psychologically.
- **Addressing Inequality:** To help low-income families, the government or platform providers should offer subsidies for smart devices. Energy saving should not be a luxury for the rich; the system must be designed so that everyone can benefit from lower energy costs.
- **Innovation Ecosystem:** Finally, this system should be an "open platform." It should not be controlled solely by the government but should allow startups and communities to create new services using the data, fostering a sustainable ecosystem.

4. Conclusion and Future Prospects

In conclusion, to save energy using IT, Japan needs more than just new devices. We need a social infrastructure built on trust, psychology, and equity. My final proposal is a "National Energy Data Platform" that features:

1. Legal protection of privacy to build trust.
2. Nudge-based designs (defaults and social rewards) to change behavior naturally.
3. Support for vulnerable groups to ensure no one is left behind.

In the future, I need to research specifically how much money is required to subsidize low-income households for this transition. Society must move from "energy consumption" to "intelligent energy management," and this requires changing our mindset as much as our technology.

5. References

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2. European Commission. (2018). *General Data Protection Regulation (GDPR)*. Official Journal of the European Union.https://gdpr-info.eu/#:~:text=Here%20you%20can%20find%20the%20official%20PDF%20of,L%20127%2C%2023.5.2018%20as%20a%20neatly%20arranged%20website.
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Improving global sleep deprivation

～How we can sleep better~

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【Improving global sleep deprivation】 5317 Harumi Shiraiwa-2

Abstract （研究の概要）

I decided to research sleeping disorders and improve people's lack of sleeping. My main research tool is the internet and dook. I learned there is a lot of caution in sleeping disorders. For example, working for a long time,smoking, depression. And I realized it is related with their country's customs and cultures, so I want to propose the suitable way.

1. Introduction (Background, Significance, and Purpose)

One day I noticed that most students looked sleepy in class. Then, I wondered what the global sleepy situation is like and why people become sleepy in the daytime. I think people become sleepy not always in school but also in society. So I want to think of a counterplan about this problem.

1-1. Social Context (Current Situation and Problems)

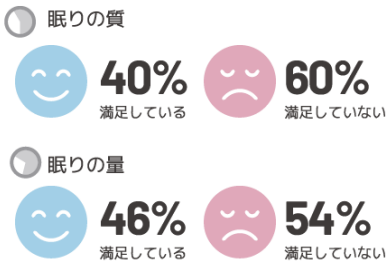
I researched the global sleepy situation. More than half of the population are not satisfied with the quality and amount of sleep in the world. And there is a two hour difference in sleep duration between countries that get enough sleep and those that do not. In the world,there are a lot of people who have sleeping disorders and lack of sleep. I want to approach these problems too.

1-2. Previous Research

My first question is "It is often said that people in Japan sleep for a short amount of time, so I wondered how sleep duration compares around the world." I found a paper about an experiment. It said that country and sleeping time's relationship could not be found. They reported that people whose sleep duration was closer to the ideal amount of sleep in their country tended to have better health.They said ideal amount of sleep is related with county custom. And latitude is related to the amount of sleep-the county which is far from the equator.The paper didn't mention the ideal amount of sleep for each country. So I want to search for it. I think people don't know how sleeping time is suitable for them. Finding the way to find suitable time is an assignment.

1-3. Research Question (RQ)

My research question is "How can we improve sleep quality in countries where people tend to sleep for a shorter period of time." As mentioned earlier, there are differences in sleeping time in each country. I think it is important to improve sleep quality and time in countries which is poor regarding that.



1-4. Hypothesis

If I can know the ideal amount of sleep, I can propose the measure which is high quality and amount of sleep. However, many researchers have researched it but they have not found it. So finding it myself is very difficult. I try to suggest measures case by case. For example school, company, home and so on. And people may get conscious about their sleeping and it will be better.

2. Research Method

I researched treatises about sleeping.(under item reference) I referenced their research's date. And if I need, I will send questionnaires about their sleeping time and circumstances around people.

According to the treatises, health conditions get worse whether people sleep long or short.Also, twenty countries whose they took up subject of research change item-health is most best-is longer than the average of their average sleeping time. This means that every country's people sleep shorter than the best sleeping time. By this, I think my research is important.

3. Results and Discussion

3-1 Results（結果）

I found that it is a more important problem that there are many sleep disorders in the world. Japan especially has such people.I want to think about treatment for them. Suggesting ways that improve sleeping time and how to treat sleep disorders people is my agenda.

3-2 Discussion（考察）

I had only thought about how to increase the time of sleeping and high quality of sleeping but reading treatise sleep disorder handling needs too. Increasing hours of sleep needs work in company and school. For example in school, setting the chance of recording your own sleeping hour and students who are short sleep extremely teach about it. In a company, depending on how many hours you sleep, reward something-company's food becomes free. It is difficult for us to extend our sleeping hours, so it needs a connection between us and school or company.

【論文タイトル】

4. Conclusion and Future Prospects

I could not find the difference between the countries between sleeping time is less and larger.

And I could never think of a treatment for the sleeping disorders, so I want to search for it.

5. References

Title: healthy duration appear to very across culture
https://www.pnas.org/doi/10.1073/pnas.2419269122
Title:News Release
https://www.resmed.jp/hubfs/Resmed%20-%20Branding/pr_news/ResMed-World-Sleep-Survey-2024.pdf

The relationship between the number of patent applications and economic activity in each country

5318 Maoko Sugiyama

Abstract

Currently, the top five countries in terms of patent application volume account for approximately 85% of the world's total patent applications. Therefore, to identify effective initiatives for countries with lower patent application volumes, this study examines the relationship between patent application volume and economic activity indicators. The research question is: “After clarifying the relationship between patent application volume and economic conditions in each country, what are effective measures to increase patent application volume?” We propose the hypothesis that “a high volume of patent applications from domestic residents correlates with a high volume of patent applications from foreign residents,” and then examine the correlation between “patent applications from domestic residents” and “patent applications from foreign residents.” Next, we examined the correlation between these two items and the country's overall economic activity indicators. Analysis of these statistical data and subsequent discussion revealed a strong positive correlation between “patent applications from domestic residents” and “CO2 emissions,” validating the hypothesis that “a high number of patent applications from domestic residents indicates a larger scale of industrial activity in the country.” Furthermore, a strong positive correlation was found between “patent applications from foreign residents” and “GDP (2015$),” validating the hypothesis that “a higher number of patent applications from foreign residents indicates a larger scale of economic activity.” Based on the preceding analysis, the first proposed initiative is to support patent applications for industrial companies (manufacturers). The second proposed initiative is to support overseas expansion by companies (manufacturers). A future challenge is that the correlation analysis used in this study does not reveal causality; therefore, we aim to conduct analyses capable of addressing this.

1. Introduction

1.1 Social Context

Currently, the top five countries in terms of patent application volume, China, United States, Japan, Republic of Korea, and EPO, account for approximately 85% of the world's total patent applications. Therefore, to identify effective initiatives for countries with lower patent application volumes, this study examines the relationship between patent application volume and economic activity indicators.

1.3 Research Question

My research question is:
“After clarifying the relationship between the number of patent applications and economic activity indicators, what kinds of efforts are effective in increasing the number of patent applications?”

1.4 Hypothesis

2. Research Method

The structure of this study is as follows.
In Chapter 2, the relationship between the number of patent applications by country and economic activity indicators is analyzed, and the results are organized again.
In addition, in Chapter 3, the number of patent applications by country is divided into two indicators: patent applications by residents and patent applications by non-residents. The relationship between each of these and economic activity indicators is analyzed.
In Chapter 4, based on the results of Chapters 2 and 3, effective efforts to increase the number of patent applications are discussed.
Finally, in Chapter 5, the conclusion of the study and future prospects are presented.

3. Results and Discussion

3.1 Results

First, this study analyzes the relationship between the number of patent applications by country and economic activity indicators.
This study proceeds with the analysis based on the following hypothesis.

Hypothesis 1:
"If the value of economic activity indicators per person is high, the number of global patent applications by country is large."

The data used in this study are from the *World Bank Databank World Development Indicators* [1] and the *World Intellectual Property Indicators* [9].

a) Analysis Using Four Economic Activity Indicators

In this section, four economic activity indicators are used:
"GDP per capita," "working-age population," "CO_2 emissions per capita," and "net national income per capita."
Based on these, four hypotheses are set.

For Question 1:
"Is there a correlation between each of 'GDP per capita,' 'working-age population,' 'CO_2 emissions per capita,' and 'net national income per capita,' and the number of global patent applications of that country?"
the following four questions and hypotheses are set,

Q1-1:
"Is there a correlation between 'GDP per capita' and the number of global patent applications of that country?"
The hypothesis is as follows:
Hypothesis 1-1:
"If GDP per capita is high, the number of global patent applications is large."

Q1-2:
"Is there a correlation between 'working-age population' and the number of global patent applications of that country?"
The hypothesis is as follows:
Hypothesis 1-2:
"If the working-age population is large, the number of global patent applications is large."

Q1-3:
"Is there a correlation between 'CO_2 emissions per capita' and the number of global patent applications of that country?"
The hypothesis is as follows:
Hypothesis 1-3:
"If CO_2 emissions per capita are high, the number of global patent applications is large."

Q1-4:
"Is there a correlation between 'net national income per capita' and the number of global patent applications of that country?"
The hypothesis is as follows:
Hypothesis 1-4:
"If net national income per capita is high, the number of global patent applications is large."

The subjects of the analysis are 36 OECD member countries in 2019.
From the viewpoint of spreading young people's innovation to the world, OECD member countries, which are likely to trade with the world, were chosen as the subjects of this study.
The reason for choosing 2019 is that the COVID-19 pandemic was expected to affect the number of patent applications, so the year before the pandemic was selected. Later data showed that there was not a large difference in the number of patent applications before and after COVID-19, but this was found during the research process, so 2019 was used in this study.

As the method of analysis, correlation coefficients between the number of global patent applications by country and economic activity indicators were calculated.

The results of the analysis of the correlation between the number of global patent applications and economic activity indicators are shown in the following four graphs.

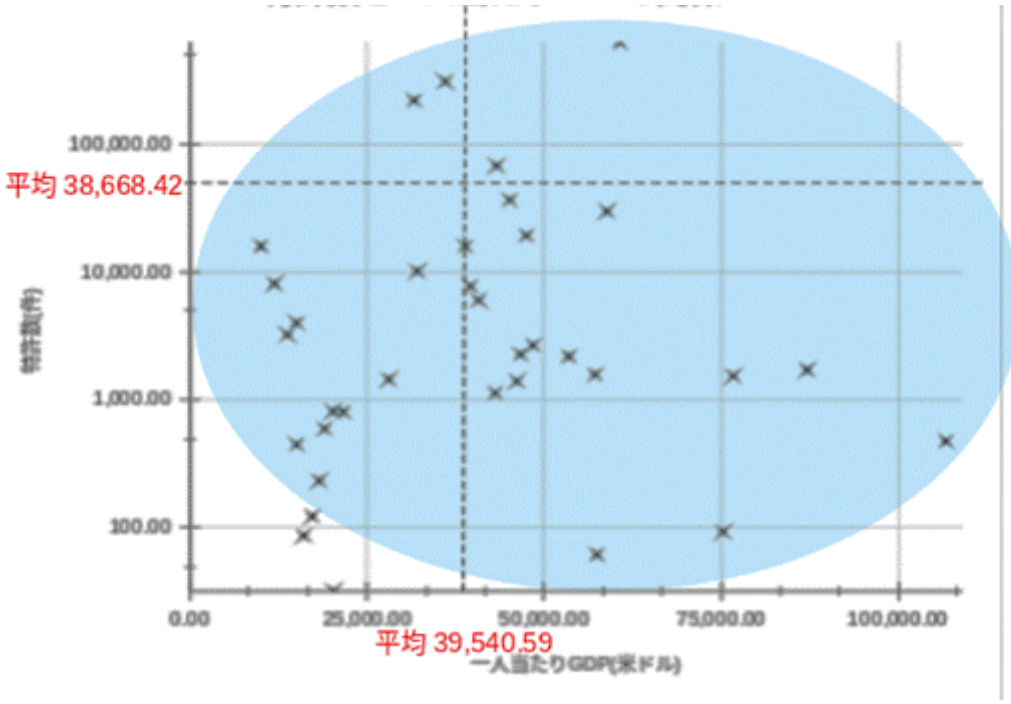


Figure 2.1 Relationship between the Number of Global Patent Applications and GDP per Capita

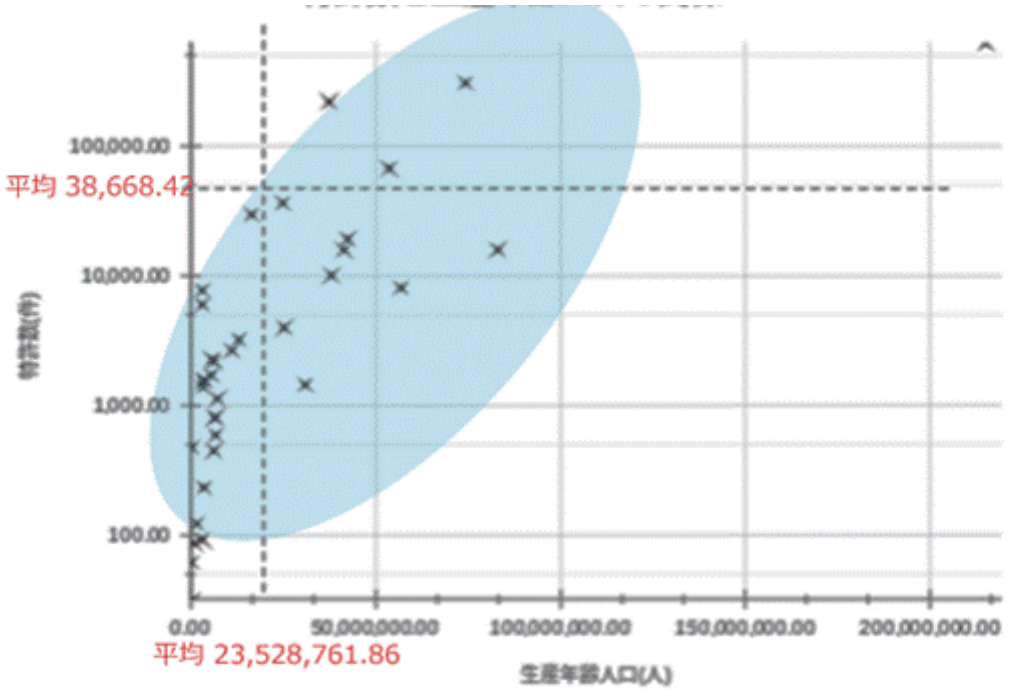


Figure 2.2 Relationship between the Number of Global Patent Applications and the Working-Age Population

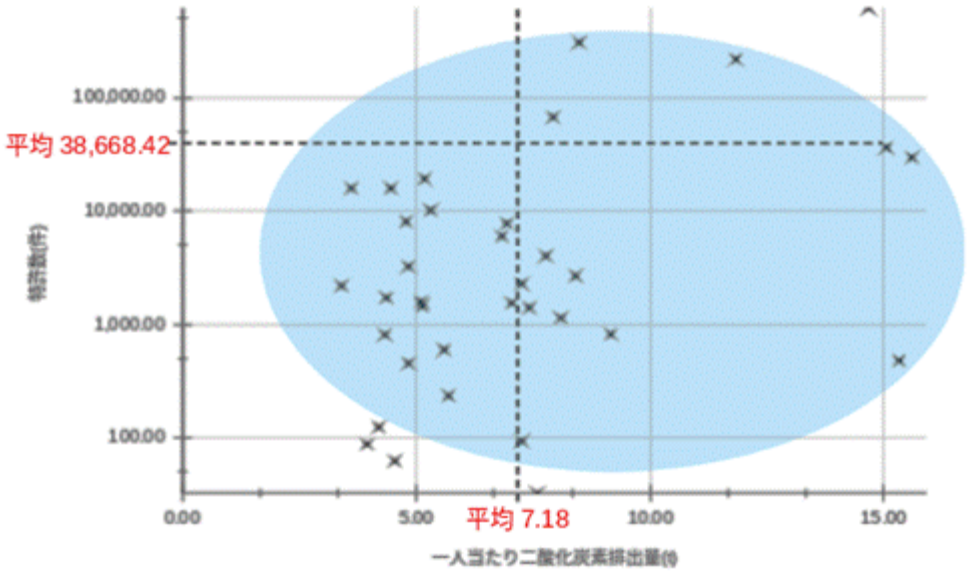


Figure 2.3 Relationship between the Number of Global Patent Applications and CO_2 Emissions per Capita

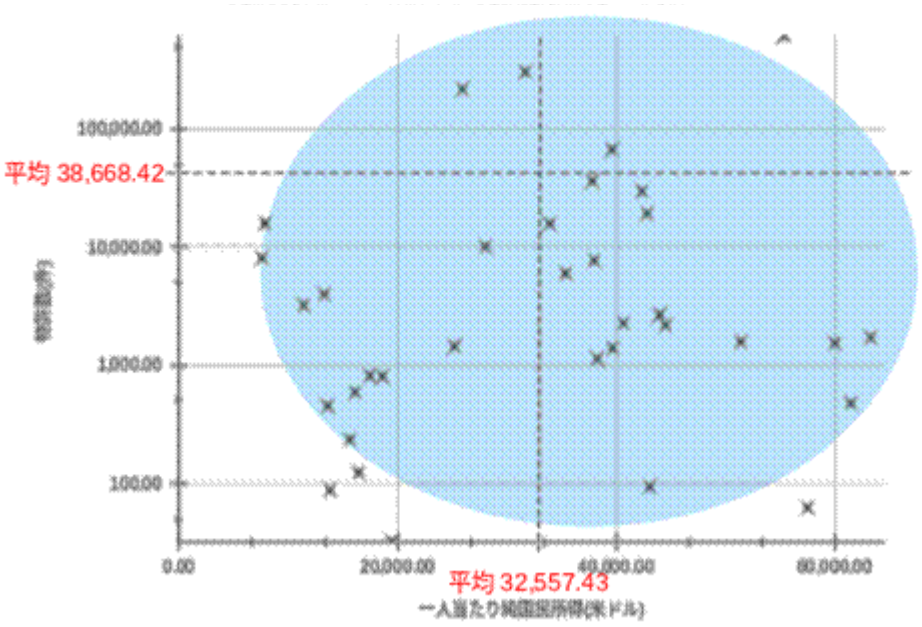


Figure 2.4 Relationship between the Number of Global Patent Applications and Net National Income per Capita

The correlation coefficients are shown below.

Table 2.1 Correlation Coefficients between the Number of Global Patent Applications and Economic Activity Indicators

Economic Activity Indicator	Correlation Coefficient	Result of Hypothesis Testing
GDP per capita	0.11	Hypothesis 1-1: Not supported
Working-age population	0.87	Hypothesis 1-2: Supported
CO_2 emissions per capita	0.46	Hypothesis 1-3: Not necessarily supported
Net national income per capita	0.20	Hypothesis 1-4: Not supported

From these results, it was found that the working-age population has a strong positive correlation with the number of global patent applications.
On the other hand, GDP per capita, CO_2 emissions per capita, and net national income per capita show low correlations.

Therefore, the results of the four hypotheses are as follows:
Hypothesis 1-1, “If GDP per capita is high, the number of global patent applications is large,” is not supported.
Hypothesis 1-2, “If the working-age population is large, the number of global patent applications is large,” is supported.
Hypothesis 1-3, “If CO_2 emissions per capita are high, the number of global patent applications is large,” is not necessarily supported.
Hypothesis 1-4, “If net national income per capita is high, the number of global patent applications is large,” is not supported.

This study reached these conclusions.

b) Analysis Based on New Hypotheses Derived from the Results

Based on the above results, a new hypothesis can be suggested:

Indicators “per capita” tend to show low correlations, while indicators that represent the “whole country,” such as the working-age population, tend to show strong positive correlations.

Therefore, the three indicators that showed low correlations in the first analysis were changed to indicators for the whole country, and the correlation analysis was conducted again.
Because GDP and net national income are similar indicators, only GDP was used. The analysis was carried out using “GDP (constant 2015 US dollars)” and “CO_2 emissions.”
Based on this, the following two new hypotheses were added.

For the additional Question 1:
“Is there a correlation between ‘GDP’ and ‘CO_2 emissions’ and the number of global patent applications of that country?”
the following two questions and hypotheses were set.

Q1-5:
“Is there a correlation between ‘GDP’ and the number of global patent applications of that country?”
The hypothesis is as follows:
Hypothesis 1-5:
“If GDP is large, the number of global patent applications is large.”

Q1-6:
“Is there a correlation between ‘CO_2 emissions’ and the number of global patent applications of that country?”
The hypothesis is as follows:
Hypothesis 1-6:
“If CO_2 emissions are large, the number of global patent applications is large.”

The following graphs show the correlation between the number of global patent applications and the two additional economic activity indicators.

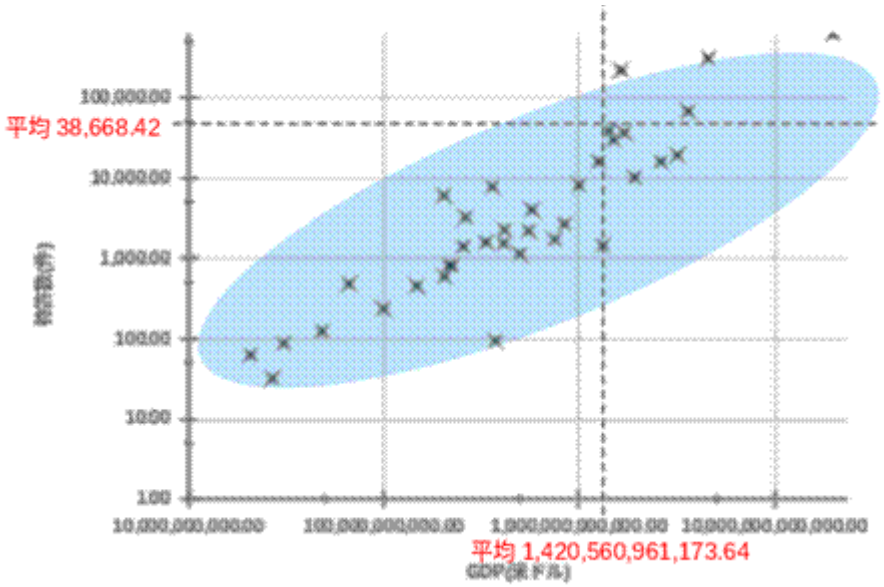


Figure 2.5 Relationship between the Number of Global Patent Applications and GDP

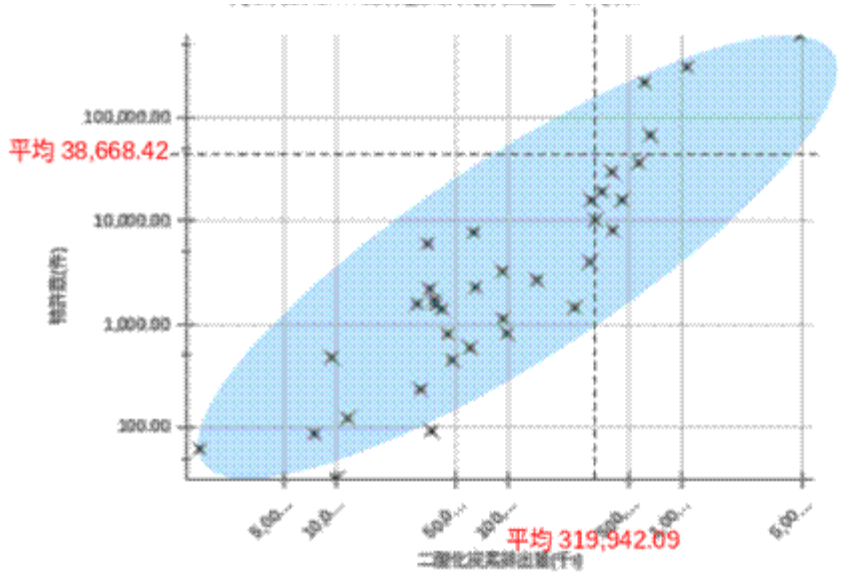


Figure 2.6 Relationship between the Number of Global Patent Applications and CO_2 Emissions

The correlation coefficients are shown below.

Table 2.2 Correlation Coefficients between the Number of Global Patent Applications and Economic Activity Indicators

Economic Activity Indicator	Correlation Coefficient	Result of Hypothesis Testing
GDP	0.92	Hypothesis 1-5: Supported
CO_2 emissions	0.94	Hypothesis 1-6: Supported

From this analysis, this study concludes that the number of global patent applications is related to the overall economic size of a country.

Therefore, the results of the hypotheses are as follows:
Hypothesis 1-5, “If GDP is large, the number of global patent applications is large,” is supported.
Hypothesis 1-6, “If CO_2 emissions are large, the number of global patent applications is larg

3. Relationship between Patent Applications by Residents and Non-Residents and Economic Activity Indicators

From the analysis in Chapter 2, it was clarified that the number of global patent applications is related to the overall economic size of a country.
Therefore, in this chapter, the number of patent applications by country is divided into two indicators: patent applications by residents and patent applications by non-residents, and a more detailed analysis is conducted.

c) Hypothesis Setting and Specific Analysis Based on Assumptions about Patent Applications

Many patent applications are related to the manufacturing of products, while relatively few are related to services.
Therefore, the following two assumptions are made in this study.

- **Patent applications by residents:** represent the industrial level of the country
- **Patent applications by non-residents:** represent the attractiveness of the country’s market

Based on these assumptions, the following hypothesis is set.

Q2:
"Is there a correlation between the number of patent applications by residents and the number of patent applications by non-residents?"

The hypothesis is as follows:
Hypothesis 2:
"If the number of patent applications by residents is large, the number of patent applications by non-residents is also large."

The meaning of this hypothesis is that if a country's industrial level is high, the attractiveness of its market is also high.

In addition, this study examines the following question.

Q3:
"Is there a correlation between 'GDP,' 'CO_2 emissions,' and 'working-age population' and the number of patent applications by residents and by non-residents?"

To examine this question, it is divided into six questions, and six hypotheses are set as follows.

Q3-1-1:
"Is there a correlation between the number of patent applications by residents and GDP?"
Hypothesis 3-1-1:
"If the number of patent applications by residents is large, the scale of economic activity is large."

Q3-1-2:
"Is there a correlation between the number of patent applications by residents and CO_2 emissions?"
Hypothesis 3-1-2:
"If the number of patent applications by residents is large, the scale of industrial activity in the country is large."

Q3-1-3:
"Is there a correlation between the number of patent applications by residents and the working-age population?"
Hypothesis 3-1-3:
"If the number of patent applications by residents is large, the scale of the country's labor market is large."

Q3-2-1:
"Is there a correlation between the number of patent applications by non-residents and GDP?"
Hypothesis 3-2-1:

“If the number of patent applications by non-residents is large, the scale of economic activity is large.”

Q3-2-2:
“Is there a correlation between the number of patent applications by non-residents and CO_2 emissions?”
Hypothesis 3-2-2:
“If the number of patent applications by non-residents is large, the scale of industrial activity in the country is large.”

Q3-2-3:
“Is there a correlation between the number of patent applications by non-residents and the working-age population?”
Hypothesis 3-2-3:
“If the number of patent applications by non-residents is large, the scale of the country’s labor market is large.”

Research Method

First, data on “patent applications by residents,” “patent applications by non-residents,” and economic activity indicators for each country were collected using *World Development Indicators* from World Bank Open Data [1].
Then, the correlations between each type of patent application and the economic activity indicators were analyzed.

For selecting the countries for analysis, the following three criteria were used:

- the top 20 countries in the number of global patent applications,
- the top 20 countries in the number of global patent grants, and
- middle-income countries that have shown a rapid increase in global patent applications in recent years.

To select the specific countries, *World Intellectual Property Indicators 2023* [9] was used.
As a result, a total of 31 countries were selected, listed in alphabetical order: Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, India, Indonesia, Iran, Israel, Italy, Japan, Korea, Malaysia, Mexico, the Netherlands, Norway, Russia, Singapore, South Africa, Sweden, Switzerland, Thailand, Turkey, the United Kingdom, the United States, and Vietnam.

The economic activity indicators used in this study are GDP, CO_2 emissions, and the working-age population.
These three indicators were chosen because they showed strong positive correlations with the number of global patent applications in Chapter 2.
In this study, GDP represents the scale of economic activity, CO_2 emissions represent the scale of industrial activity, and the working-age population represents the scale of the labor

market.

Because complete data were needed for all countries, all indicators used in this analysis are from 2019.

Items of Analysis

Therefore, the following seven analyses were conducted.

1. Correlation between patent applications by residents and patent applications by non-residents
2. Correlation between patent applications by residents and GDP (constant 2015 US dollars)
3. Correlation between patent applications by residents and CO_2 emissions
4. Correlation between patent applications by residents and the working-age population
5. Correlation between patent applications by non-residents and GDP (constant 2015 US dollars)
6. Correlation between patent applications by non-residents and CO_2 emissions
7. Correlation between patent applications by non-residents and the working-age population

By calculating the correlation coefficients for Analyses 1 to 7, indicators with strong positive correlations are identified.
These indicators are considered important factors when discussing effective measures to increase the number of patent applications.
Based on these results, effective efforts are discussed.

Table 3.1 Framework of the Analysis in This Study (Calculation of Correlations)

- Patent applications by residents
- Patent applications by non-residents

GDP: Scale of economic activity
CO_2 emissions: Scale of industrial activity
Working-age population: Scale of labor market

d) Results of Each Analysis and Verification of the Hypotheses

1. Results of the Analysis on the Relationship between Patent Applications by Residents and Non-Residents by Country

For the 31 countries analyzed, the graphs of “patent applications by residents” and “patent applications by non-residents” by country are shown below.
The vertical axis uses a logarithmic scale.

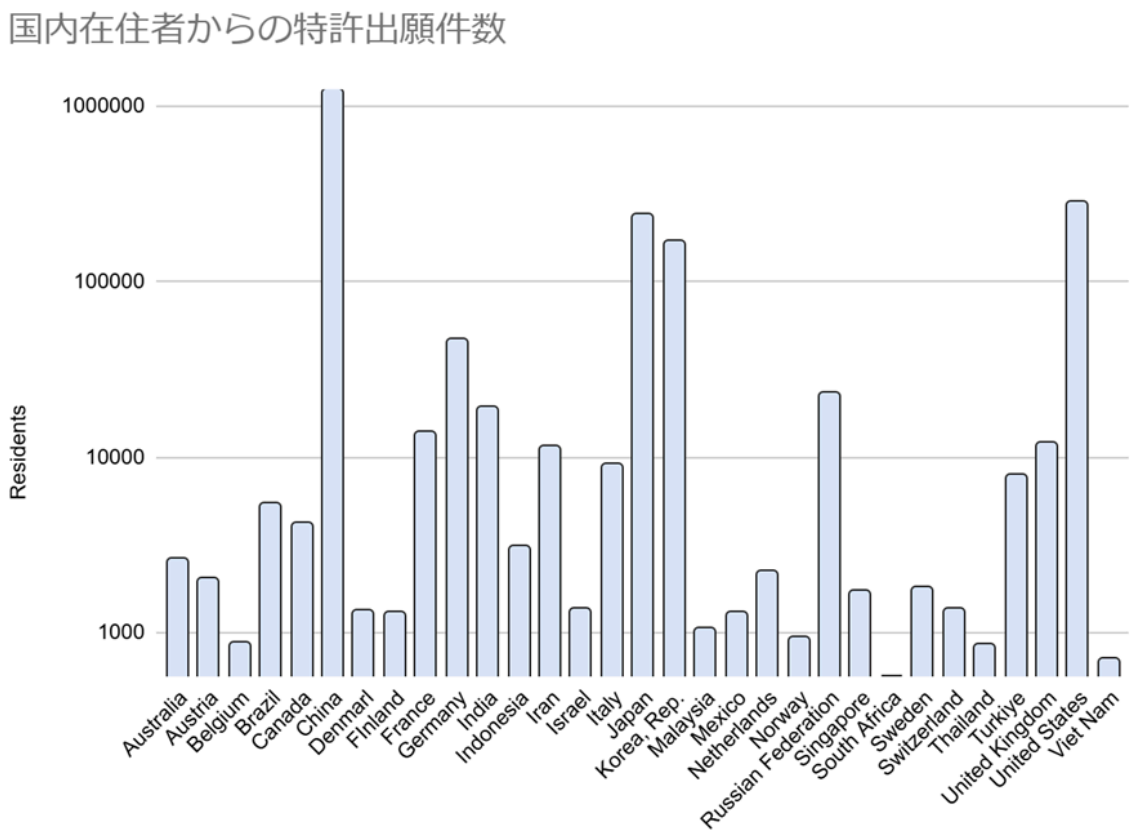


Figure 3.1 Patent Applications by Residents by Country

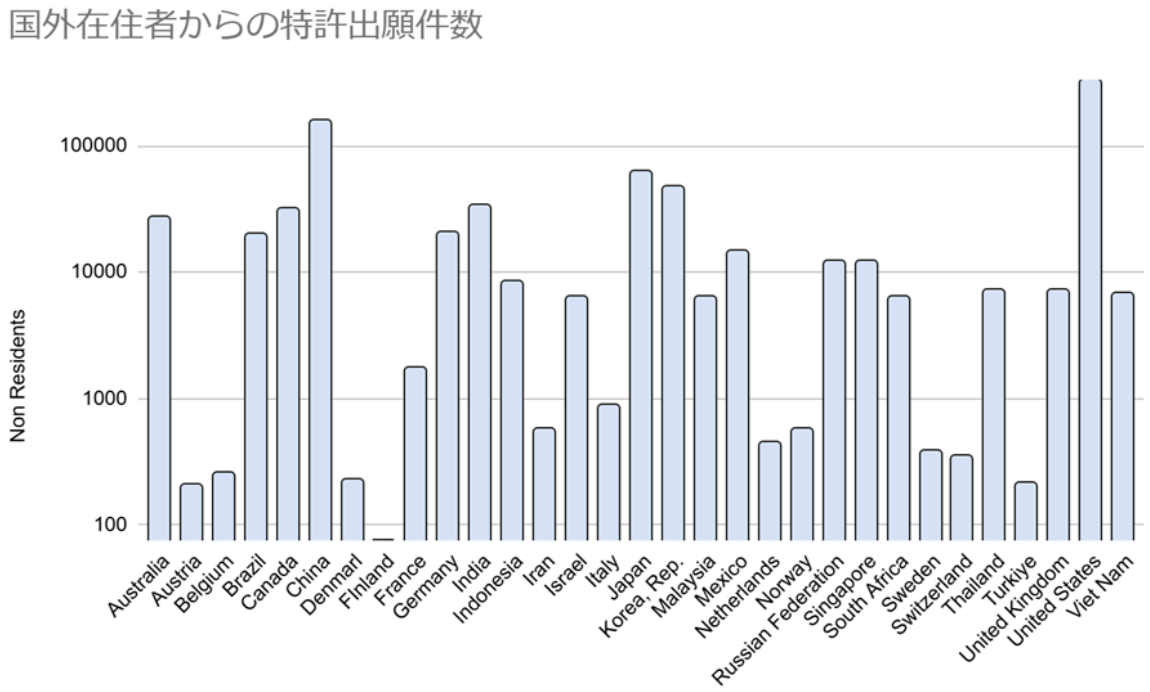


Figure 3.2 Patent Applications by Non-Residents by Country

From a comparison of Figures 3.1 and 3.2, countries where the number of patent applications by residents is relatively small but the number of patent applications by non-residents is relatively large include Australia, Brazil, Canada, Indonesia, Israel, Malaysia, Mexico, South Africa, Thailand, and Vietnam.
In these countries, the industrial level is not very high, but the attractiveness of the country's market is considered to be high.

In contrast, countries where the number of patent applications by residents is relatively large but the number of patent applications by non-residents is relatively small include Finland, Iran, and Turkey.
In these countries, the industrial level is relatively high, but the country's market attractiveness is considered to be lower.

Next, the graphs showing the correlation between the **number of patent applications filed by residents** and the **number of patent applications filed by non-residents** are presented below. In these graphs, both the vertical and horizontal axes use logarithmic scales.

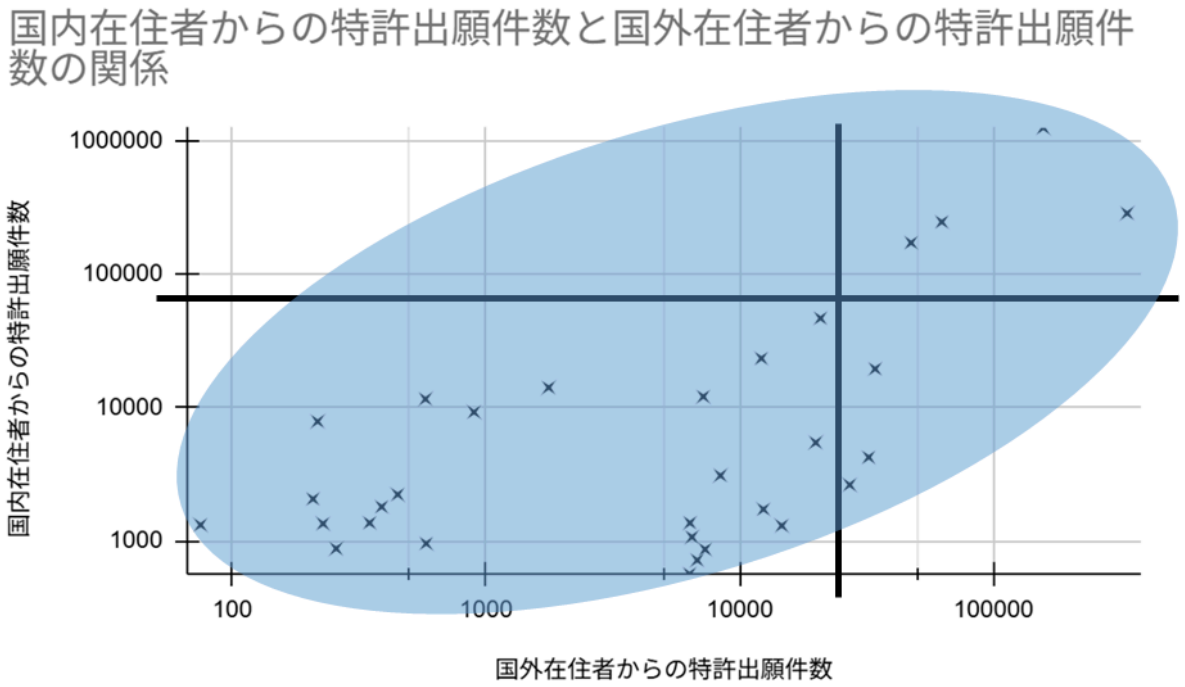


Figure 3.3 Relationship between the number of patent applications filed by residents and non-residents

Based on this analysis, the correlation results are summarized in Table 3.2.

Table 3.2 Correlation coefficient between patent applications filed by residents and non-residents

Item	Correlation Coefficient	Hypothesis Testing
Patent applications by residents vs. non-residents	0.58	Hypothesis 2: Partially supported

From this result, a **weak positive correlation** was observed between the number of patent applications filed by residents and those filed by non-residents. In other words, there is only a weak relationship between a country's **industrial level** and its **market attractiveness**. Even if a country has a high industrial level, it does not necessarily mean that the country is attractive as a market.

Therefore, in this study, **Hypothesis 2**, which states that *"a higher number of patent applications filed by residents leads to a higher number of patent applications filed by non-residents,"* is judged to be **partially supported**.

Analysis of the Relationship between Patent Applications by Residents and Economic Activity Indicators

The results of the correlation analysis between the **number of patent applications filed by residents** and various **economic activity indicators** are shown in the following graphs. In all graphs, both axes use logarithmic scales.

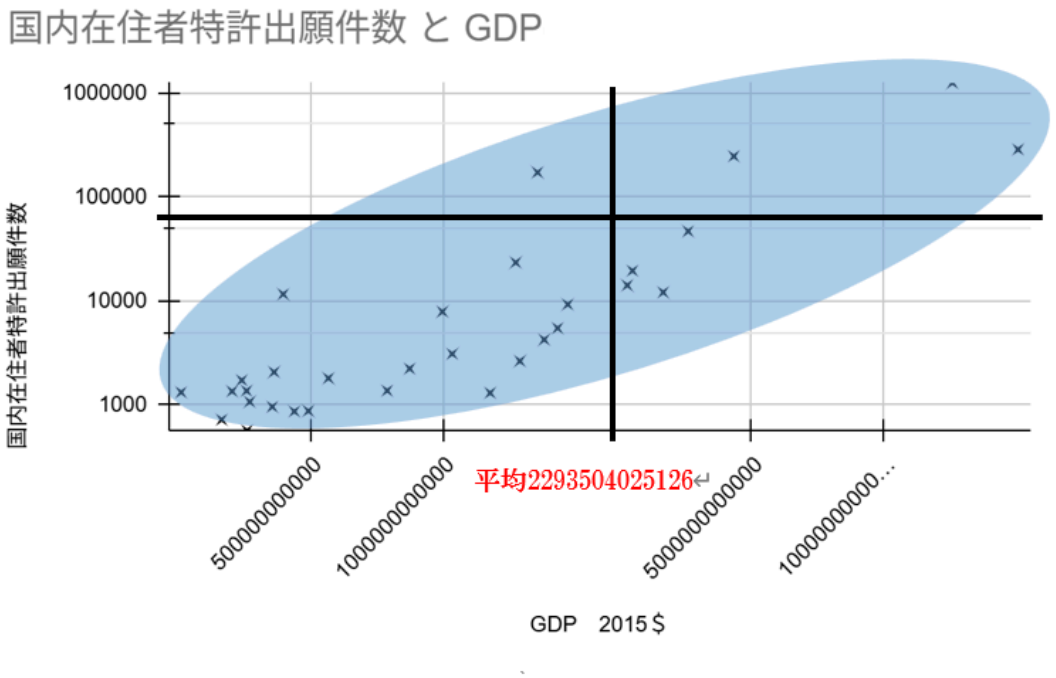


Figure 3.4 Relationship between the number of patent applications filed by residents and GDP

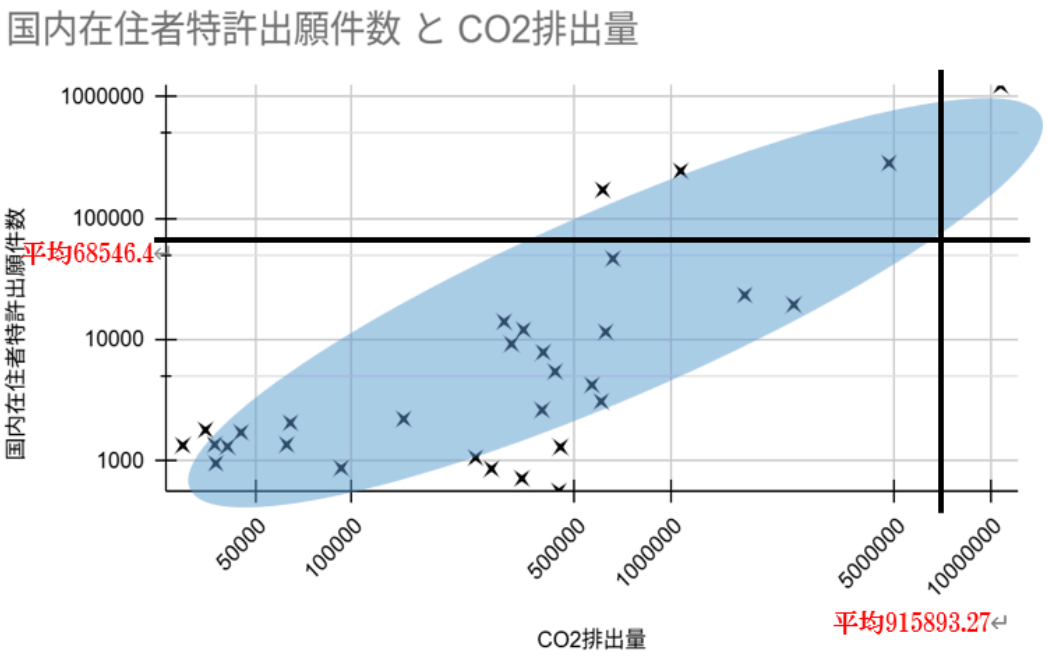


Figure 3.5 Relationship between the number of patent applications filed by residents and CO_2 emissions

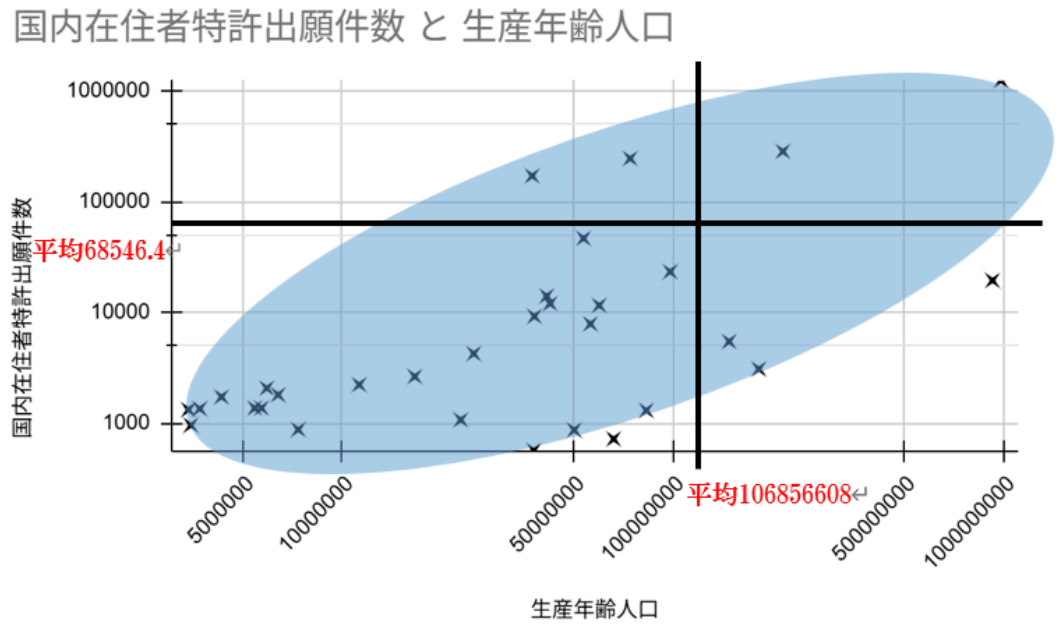


Figure 3.6 Relationship between the number of patent applications filed by residents and the working-age population

The correlation coefficients are summarized in Table 3.3.

Table 3.3 Correlation coefficients between patent applications filed by residents and

economic activity indicators

Economic Indicator	Correlation Coefficient	Hypothesis Testing
GDP: Scale of economic activity	0.71	Hypothesis 3-1-1: Partially supported
CO_2 emissions: Scale of industrial activity	0.94	Hypothesis 3-1-2: Supported
Working-age population: Scale of the labor market	0.69	Hypothesis 3-1-3: Partially supported

From the results in Table 3.3, a **strong positive correlation** exists between a country's **industrial level** and the **scale of industrial activity**. This indicates that countries with higher industrial levels tend to have larger industrial activity scales.

In addition, positive correlations are observed between a country's industrial level and both the **scale of economic activity** and the **scale of the labor market**. This suggests that a higher industrial level is associated, to some extent, with larger economic activity and labor markets.

Therefore, the verification results of the three hypotheses are as follows:

- **Hypothesis 3-1-1**: *"A higher number of patent applications filed by residents leads to a larger scale of economic activity"* — **partially supported**
- **Hypothesis 3-1-2**: *"A higher number of patent applications filed by residents leads to a larger scale of industrial activity"* — **supported**
- **Hypothesis 3-1-3**: *"A higher number of patent applications filed by residents leads to a larger scale of the labor market"* — **partially supported**

Analysis of the Relationship between Patent Applications by Non-Residents and Economic Activity Indicators

The results of the correlation analysis between the **number of patent applications filed by non-residents** and various **economic activity indicators** are shown below. All graphs use

logarithmic scales on both axes.

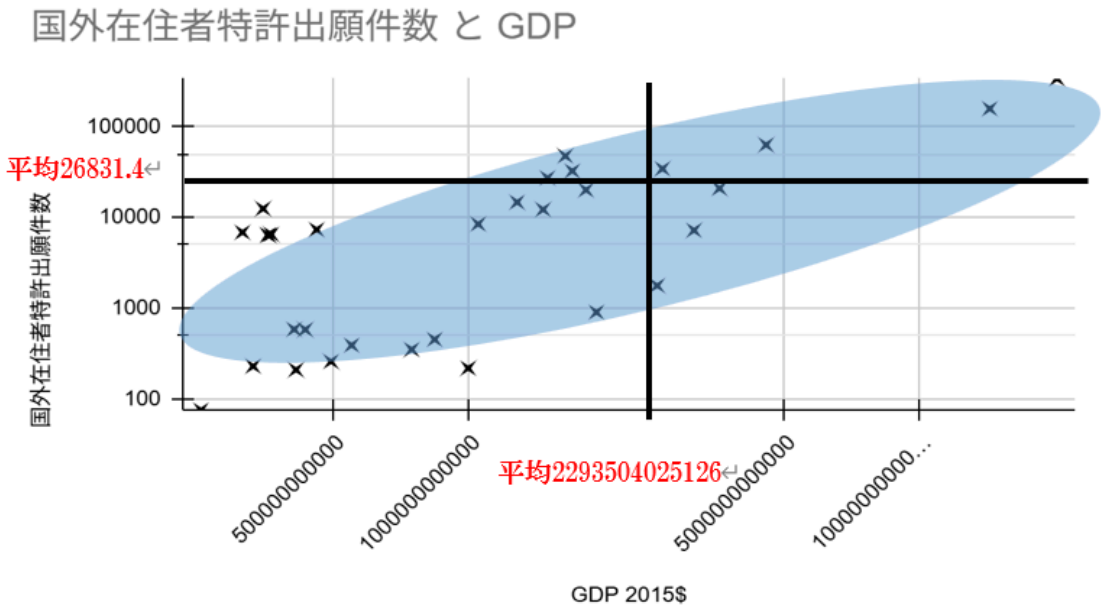


Figure 3.7 Relationship between the number of patent applications filed by non-residents and GDP

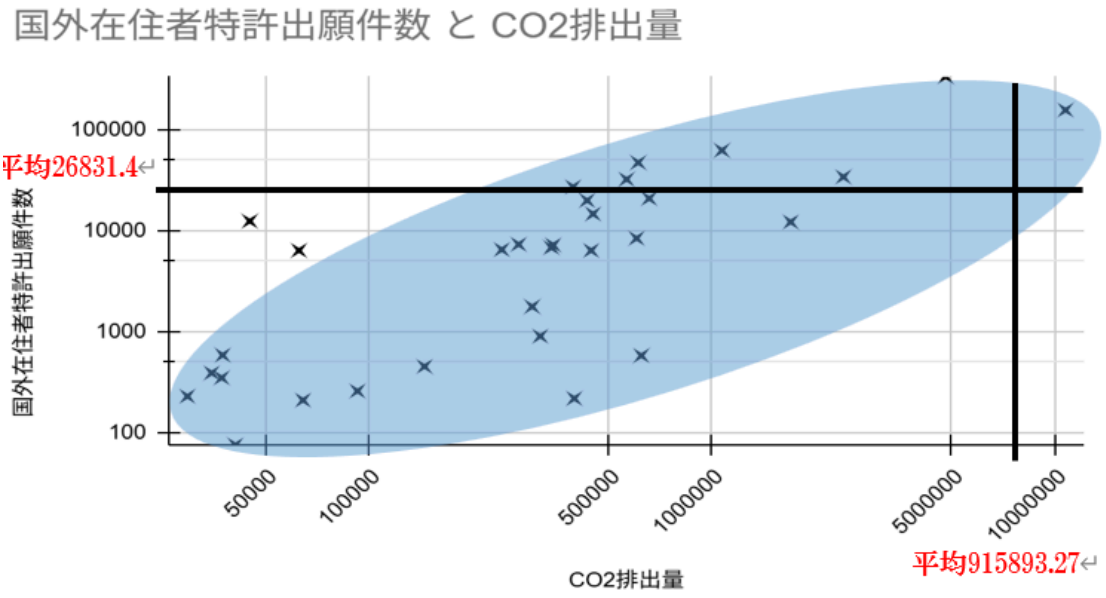


Figure 3.8 Relationship between the number of patent applications filed by non-residents and CO_2 emissions

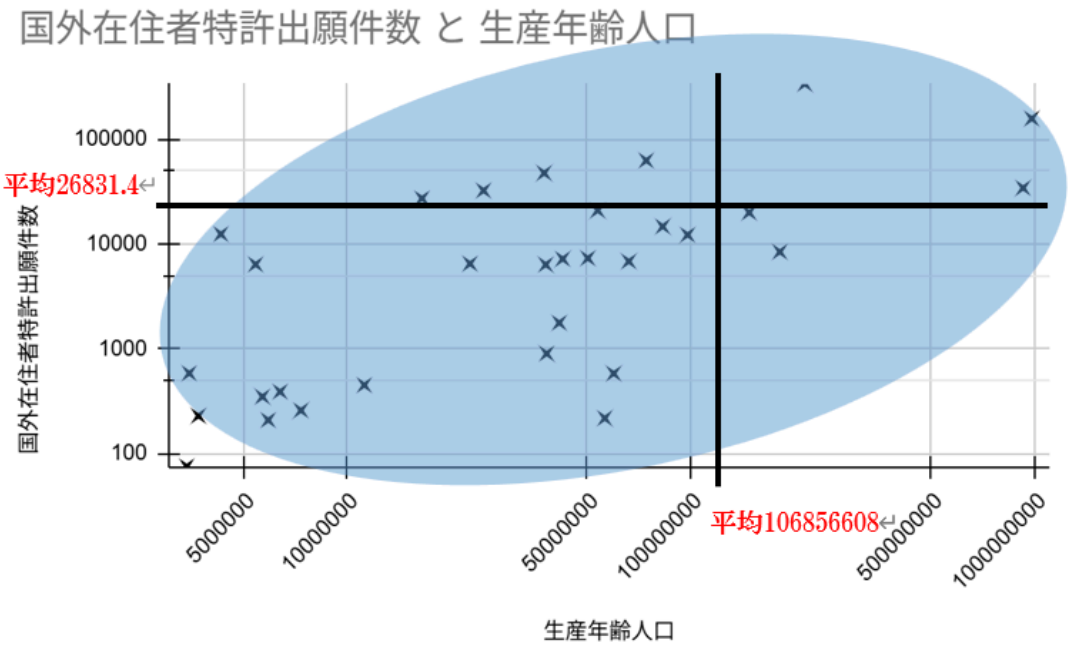


Figure 3.9 Relationship between the number of patent applications filed by non-residents and the working-age population

The correlation results are summarized in Table 3.4.

Table 3.4 Correlation coefficients between patent applications filed by non-residents and economic activity indicators

Economic Indicator	**Correlation Coefficient**	**Hypothesis Testing**
GDP: Scale of economic activity	0.96	Hypothesis 3-2-1: Supported
CO_2 emissions: Scale of industrial activity	0.70	Hypothesis 3-2-2: Partially supported
Working-age population: Scale of the labor market	0.41	Hypothesis 3-2-3: Not necessarily supported

From the results in Table 3.4, a **strong positive correlation** is observed between a country's **market attractiveness** and the **scale of economic activity**. This suggests that countries with higher market attractiveness tend to have larger economic activity scales.

Additionally, a positive correlation exists between market attractiveness and the scale of industrial activity, indicating a moderate relationship. However, only a **weak positive correlation** is observed between market attractiveness and the scale of the labor market. This implies that even if a country is attractive as a market, it does not necessarily have a large labor market.

Therefore, the verification results of the three hypotheses are as follows:

- **Hypothesis 3-2-1**: *"A higher number of patent applications filed by non-residents leads to a larger scale of economic activity"* — **supported**

- **Hypothesis 3-2-2**: *"A higher number of patent applications filed by non-residents leads to a larger scale of industrial activity"* — **partially supported**

- **Hypothesis 3-2-3**: *"A higher number of patent applications filed by non-residents leads to a larger scale of the labor market"* — **not necessarily supported**

3.2 Discussion

Based on the analysis results and discussion in Chapters 2 and 3 using statistical data, it was first found from the analysis in Chapter 2 that the **global number of patent applications** has a strong positive correlation with **national economic activity indicators**. Based on this result, a more detailed analysis was conducted in Chapter 3.

The results showed a strong positive correlation between the **number of patent applications filed by residents** and **CO_2 emissions**, supporting **Hypothesis 3-1-2**. This indicates that countries with higher industrial levels tend to have larger scales of industrial activity, and that an increase in patent applications by residents is related to domestic industrial strength.

In addition, a strong positive correlation was found between the **number of patent applications filed by non-residents** and **GDP**, supporting **Hypothesis 3-2-1**. This suggests that countries with higher market attractiveness tend to have larger economic activity scales, and that an increase in patent applications by non-residents is related to national economic strength.

Although causal relationships cannot be determined from this analysis, it can be expected that improving domestic industrial strength would contribute to an increase in patent applications filed by residents. Therefore, initiatives to strengthen domestic industrial capacity are considered important.

The first proposed initiative is **support for research and development and patent applications for industrial companies (manufacturers)**. As described in previous studies, most patent applications are filed by companies, especially manufacturers. Therefore, as a national policy, this study proposes supporting the matching of patent attorneys with

companies and covering the costs of hiring patent attorneys through national projects.

Similarly, although causality cannot be confirmed, improving a country's economic strength may contribute to an increase in patent applications filed by non-residents. Therefore, strengthening domestic industrial capacity is again considered important.

The second proposed initiative is **financial support for overseas expansion by companies (manufacturers)**. When companies expand overseas, they file patents in host countries, contributing to an increase in patent applications and positively affecting economic activity indicators in those countries. At the same time, profits earned abroad benefit the home country's economy, leading to increased economic strength and potentially increasing the number of patent applications filed by non-residents in the home country. Thus, policies that financially support overseas expansion are expected to generate economic returns for the home country.

4. Conclusion and Future Work

This study examined which national initiatives are effective in promoting the diversification of global innovation and economic development. Through correlation analysis, it was found that the **global number of patent applications** has a strong positive correlation with **national economic activity indicators**.

Furthermore, by dividing global patent applications into those filed by **residents** and **non-residents**, their relationships with economic indicators were examined. Patent applications filed by residents showed a particularly strong positive correlation with **CO_2 emissions**, while those filed by non-residents showed a particularly strong positive correlation with **GDP**.

Although causal relationships cannot be determined, this study concludes that increasing patent applications filed by residents may be achieved through research and development support and patent application support for domestic manufacturers, while increasing patent applications filed by non-residents may be promoted through support for overseas expansion by companies.

As a future task, since correlation analysis cannot reveal causality, more advanced analytical methods are needed. However, such analyses require specialized knowledge in data science and statistics, which the author plans to study at university.

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Title: Asahi Suzuki R6 FEWC IV Research Paper

The number of people keeping exotic pets is increasing. However, there are very few veterinarians who can treat these animals. To fix this, I thought of three main actions.

1. **Increase the number of veterinarians:** This is a way to make the whole vet field more active by simply having more vets.
2. **Add exotic animals to vet school lessons:** This is to get more people who want to become vets that specialize in exotic animals.
3. **Start a global test for exotic animals:** This is to make sure vet care is good and stays the same all over the world.

If we can do these things, vet care for exotic animals will get better around the world.

---

1. Introduction (Background, Importance, and Purpose)

1-1 Social Trends (Current Situation and and Problem)

The number of exotic pets is growing in recent years.

United States:

- It is said that several million exotic animals were already kept as pets in the 1900s.
- A survey by the American Pet Products Association (APPA) shows that the number of homes with small animals is increasing. In a 2021 survey, over 14 million homes reported having an exotic pet.

United Kingdom:

- Data from the Pet Food Manufacturers' Association (PFMA) shows that over 10 million small animals were kept as pets in 2019.

Japan:

- A 2019 survey by the Japan Pet Food Association found that about 5 million small animals (birds, hamsters, guinea pigs, etc.) were kept as pets in Japan.

Germany:

- About 14 million small animals are kept as pets.

Australia:

- Exotic pets are becoming more popular.

In Japan, the number of imported exotic animals is growing, and it's likely that these pets are also becoming popular in the countries they come from.

From the above, it seems that exotic pets are becoming common in countries like the US, Germany, UK, Japan, Australia, Indonesia, China, Vietnam, Czech Republic, Taiwan, and South Korea. It seems to be mainly spreading in developed countries.

A problem worldwide is that vet care for exotic pets is not yet fully developed, and there are not enough vets who can treat them. This problem is especially big in Japan, where people often have to travel far to get their exotic pets treated. As the number of exotic pets grows, the need for vets who can treat them will only get bigger.

1-2 Prior Research 1

Around the world, there are groups that give special education to vets to improve their medical skills.

- **Improve International:** This group works with others to provide special lessons.
- ISVPS: This group gives out certificates for the tests.
  These groups work together. Improve International gives special lessons, and ISVPS gives the certificate for the test.
  A study in Japan aimed to improve vet care skills in the country. If the results of this study can be used in other countries, it would be a good idea.

1-3 Research Question

How can we improve vet care for exotic animals?

1-4 Hypotheses

1. Increase the number of veterinarians
   To improve medical skills, we first need to make the vet field more active.

（１）獣医学部卒業生１人に対する国際比較

	日本	イギリス	ドイツ	フランス	アメリカ
a.学校数	16校	6校	5校	4校	28校
b.年間卒業者数	925人	509人	960人	453人	約2,100人
c.人口	126,926千人	56,352千人	82,087千人	56,634千人	281,422千人
卒業者１人に対する人口（c/b）	137千人	111千人	86千人	125千人	134千人
		平均：約101千人			

Looking at the table above, the number of vets compared to the total population is about the same in different countries.

According to the website https://jyui.net/veterinarian/fusoku/, Japan has few vets in research, government jobs, and industry.

Looking at the table below and the one above, we can see that these 5 countries have few vets in research.

- **Government vets:** Vets who work on public health in a certain area.
- **Industry vets:** Vets who treat farm animals like cows and pigs.

2. Add exotic animals to vet school lessons
   Currently, there are only a few universities where you can study about exotic animals.

United States:

- University of California, Davis (UC Davis): Has special programs for exotic and wild animals. You can get hands-on experience through practice and research projects.

- Cornell University: The vet school offers courses for exotic animals where you can learn about treatment and care.
- University of Florida: Has a special program for exotic and wild animals with lots of hands-on practice.
- Tufts University: Focuses on special care for exotic animals and has many research facilities.

United Kingdom:

- Royal Veterinary College, University of London (RVC): Has a course where you can focus on treating and caring for exotic animals.
- University of Edinburgh: Has a program for exotic and wild animals where you can get a lot of hands-on experience.
- University of Nottingham: Has special courses and practice programs for exotic animals.

Japan:

- Nippon Veterinary and Life Science University: Offers special classes and research chances for exotic animals. They also have practice at animal hospitals.
- Azabu University: Has a course to study exotic animals in a special way and offers a lot of hands-on practice.
- Kitasato University: Offers classes and practice that focus on exotic animals.

Germany:

- Ludwig-Maximilians-Universität München: Has a program where you can learn special knowledge about vet care for exotic animals.
- Leipzig University: Does research and teaches about exotic and wild animals.
- University of Veterinary Medicine Hannover: Has courses that focus on vet skills and care for exotic animals.

Canada:

- University of Guelph: Has a top vet school in Canada with a course for exotic animals.
- University of Montreal: Has good programs that focus on skills and research for exotic animals.
- University of Prince Edward Island (UPEI): Offers special lessons and hands-on practice for exotic animals.

Australia:

- University of Sydney: Has lots of chances to learn and do research on exotic and wild animals.
- University of Melbourne: Offers special programs and hands-on experience for exotic animals.

Other Countries:

- Switzerland: University of Zurich: Has a special program for treating exotic animals.
- France: National Veterinary School of Lyon: Does research and teaches about exotic animals.
- Spain: Autonomous University of Barcelona: Has a program for exotic animals in its vet school.

I think that having only three schools in Japan is a small number. Other countries probably feel the same. I think we should work with people who are already focusing on exotic animal care to create teaching materials and ask them to give lessons at universities.

3. Start a global test for exotic animals
   Here are some of the main vet associations that lead a country:
4. **United States:** American Veterinary Medical Association (AVMA): This group represents about 90,000 vets in the US.
5. **United Kingdom:** British Veterinary Association (BVA): This group represents UK vets and helps with setting rules, standards, and education for members.
6. **Canada:** Canadian Veterinary Medical Association (CVMA): This group represents the vet field in Canada and works to improve the health and well-being of animals.
7. **Australia:** Australian Veterinary Association (AVA): This group supports vet education, rules, and work ethics for vets in Australia.
8. **Japan:** Japan Veterinary Medical Association: This group represents vets in Japan and works to improve the quality of vet care and help with public health to protect both animal and human health.
9. Germany: Bundestierärztekammer (BTK): This group represents vets across Germany and works on vet ethics, laws, and education.
   What if these groups worked together to create a test?

---

2. Research Methods

First, I will find out how common exotic pets are.

→ This will show if the research is important.

Next, I will find out which countries have a lot of exotic pets or have seen a recent increase.

→ This will help me choose which countries to focus on.

I will look at the vet field (groups, associations, etc.) in these countries.

Then, I will create hypotheses based on all this information.

Finally, I will decide if the hypotheses are possible to do and if they would work.

This will lead to a conclusion and ideas for the future.

---

3. Results and Discussion

1. Increase the number of veterinarians:
   To get more vets in research, we need more people overall. I think this is a good way

to make the whole vet field more active. But to do this, we first need to make it easier for people to become vets, which means we would have to increase the number of vet schools.

2. Add exotic animals to vet school lessons:
   As mentioned above, there are few universities that have lessons for exotic animals. So, a solution is to increase these lessons to get more vets who want to specialize in this field.
3. Start a global test for exotic animals:
   If vet associations from all over the world work together, they can include the newest knowledge in the test. This would make sure vet care is good and stays the same all over the world. Because of this, people would feel comfortable going to any animal hospital.

---

4. Conclusion and Future Outlook

By doing these things, vet care for exotic animals will get better.

1. Increase the number of veterinarians.
2. Add exotic animals to vet school lessons.
3. Start a global test for exotic animals.

My next step is to make these ideas more specific. It's hard to do this with a wide area like the whole world. So I want to look more closely at things like costs, what problems to include in the test, and how to increase the number of vet lessons.

---

5. Citations and References

Ministry of Health, Labour and Welfare

Ministry of the Environment

Improve International

ISVPS

Ministry of Education, Culture, Sports, Science and Technology

Exotic Animal Information Center

Ministry of Agriculture, Forestry and Fisheries

Economic Growth and Market Prices Driven by Primary Industries

~Toward Efficient and Sustainable Commodity Sales~

群馬県立中央中等教育学校

ID 5320 氏名 Kotaro Suda

Abstract

Currently, monoculture economies, which are one of the causes of developing countries, are a topic of research in terms of how to use them for industrial development. Many monoculture economies rely on primary industries, and one of the main problems is the instability of prices and production that is characteristic of primary products. However, there are also advantages to focusing on one industry as a whole country. For example, it can be more efficient because a production line can be set up domestically, and it may be possible to take advantage of price fluctuations to make large profits. Therefore, if a system can be established to overcome the general negative image of monoculture economies and make them profitable, it may improve the economic situation of developing countries and lead to natural development while preserving the existing industries.

An example of a monoculture economy is cocoa in Côte d'Ivoire. More than 50% of Côte d'Ivoire's exports are cocoa-related products, and if cocoa production were to decline, the economic damage could be enormous. Traditionally, the country tried to promote economic development by mechanizing and shifting from the export of primary products like cocoa to the export of manufactured goods. However, the goal of this research is to improve efficiency and stability in the industry while keeping the cocoa production level in Côte d'Ivoire the same. Ultimately, the aim is to show the potential benefits of a monoculture economy and propose a production system as one way to help developing countries grow, in the context of global development.

If concrete measures for a monoculture economy can be put in place, it could save developing countries that are facing economic difficulties, while advancing economic growth by utilizing the technology gained from primary industries. Furthermore, in terms of activities toward a sustainable society, it can be said that this approach is more effective than simply focusing on mechanization. Currently, the world’s industries are centered around machinery, which has the largest trade volume and is easier to profit from. However, this system cannot function without raw materials, and if everyone seeks profit by working in the machinery industry, a shortage of resources could lead to production problems. Therefore, by establishing an efficient production system in primary industries as well, and integrating them as a key part of the global economy, it is believed that we can contribute to the further development of developing countries, the efficiency of the global economy, and its sustainability.

1. Introduction

1-1. Social Context

One of the causes of the developing country issues currently being discussed worldwide is the monoculture economy. This refers to an unstable economic situation where a single primary product makes up the majority of a country's production and exports, with examples including tea in Sri Lanka and sugar in Cuba. The problems of a monoculture economy include the price volatility of primary products, which are natural resources with little processing, and the instability of production due to natural conditions such as climate.

As a result, it is very difficult for developing countries with a monoculture economy to improve their current situation, and they face the problem of being unable to break away from production systems dominated by developed countries, which hinders economic growth.

The country of Côte d'Ivoire, located in the western part of Africa, is also trapped in a monoculture economy. 52.8% of Côte d'Ivoire's export value is made up of cocoa-related products (according to JICA), and the economy is heavily dependent on cocoa production. Additionally, since more than 70% of the workforce is in agriculture, it is clear that the country is facing a serious monoculture economy. Its GNI per capita is $2,620, ranking 160th out of 213 countries (according to the Ministry of Foreign Affairs and GLOBAL NOTE).

However, it is also known that there are advantages to a monoculture economy. One advantage is high production efficiency. If a country focuses on producing one product, it can use the same cultivation techniques. Also, since there are fewer types of materials, such as fertilizers, production can be cheaper, and investments in mechanization become possible. Another advantage is the potential for high income. As mentioned earlier, the prices of primary products can fluctuate greatly. Therefore, when prices are high, it is possible to make large profits. The goal of this research is to maximize the advantages of a monoculture economy, change its structure without changing the nature of the industry, and achieve economic independence.

I also have a question: Why do many economies develop by involving many products? I thought that in general, businesses handle one or a limited number of products to increase efficiency, so having fewer products would make it easier to create an efficient system. However, many countries today trade with a wider range of export items, and I would like to investigate the reasons for this and whether this system is truly better than a monoculture economy that handles only one product.

1-2. Previous Research

There are no clear prior studies that can be cited as preceding this research. Many researchers view the monoculture economy as a disadvantage and aim to move away from it in their studies. However, in my analysis, I believe that while monoculture economies have significant drawbacks, they also have hidden and less obvious benefits that are difficult to utilize. Generally, a monoculture economy is seen as one that relies on exports of specific primary industry products, which is unstable and has a weak position in the international market. The main disadvantage is that many primary products have unstable production levels, which in turn causes significant fluctuations in trade volumes. This point is indisputable. For example, Côte d'Ivoire's cocoa is an agricultural product that is strongly affected by climate change, abnormal weather, and other natural phenomena.

The second disadvantage is the change in market value due to global production changes. When favorable weather conditions continue and production increases in major cocoa-producing countries, an oversupply can cause prices to crash. This has long been considered a disadvantage of monoculture economies, but I believe that if used effectively, it could be turned into a profit. By increasing shipments when prices are high and reducing them when prices are low to encourage price increases, a market manipulation strategy could be

developed, which is something that only the world's largest cocoa producer could do. This idea of stabilizing profits without disrupting the cocoa production system was the starting point of my research and represents a perspective not covered in prior studies.

1-3. Research Question

The research question for this study is "What industrial structure should be adopted to efficiently sell Côte d'Ivoire's cocoa?" As mentioned earlier, Côte d'Ivoire, which has fallen into a monoculture economy with cocoa, currently holds a weak position in the global market, with low negotiating power and difficulty in making profits. To overcome this situation, I believe a more efficient industrial system is needed while making use of the country's existing large-scale cocoa production capacity. Côte d'Ivoire has already overcome issues such as securing farms, ensuring trade markets, and standardizing production methods for cocoa. In fact, it ranks first in the world for cocoa exports, demonstrating the scale of its industrial system. However, a major disadvantage of the monoculture economy that still exists is instability. Harvests are affected by climate, and price fluctuations are large, making it difficult to secure a stable income, even with the same harvest amount.

1-4. Hypothesis

The goal of this study is, first, to explore how Côte d'Ivoire can stabilize its trade volume and strengthen its position in the international market while maintaining its monoculture cocoa economy. This includes addressing cocoa price fluctuations. However, the study assumes that while prioritizing Côte d'Ivoire's interests, the impact on other countries' cocoa production will not be severe.

The hypothesis is that there is a correlation between cocoa production levels and market prices, and that this correlation greatly affects the profits of Côte d'Ivoire and other cocoa industries. To bring stable profits in a monoculture economy, I believe it is important to consider how to deal with market prices. The necessary elements would be the technology and capacity to preserve primary industry products. If there are facilities that can store cocoa without losing quality when prices are low, and maintain the ability to quickly ship it when prices rise, this could lead to higher profits. By applying this approach, when prices drop, Côte d'Ivoire, as the world's largest cocoa exporter, could reduce its export volume, leading to a recovery in market prices. This would create a form of market manipulation, allowing the country to export cocoa at the most profitable times, as desired.

2. Research Method

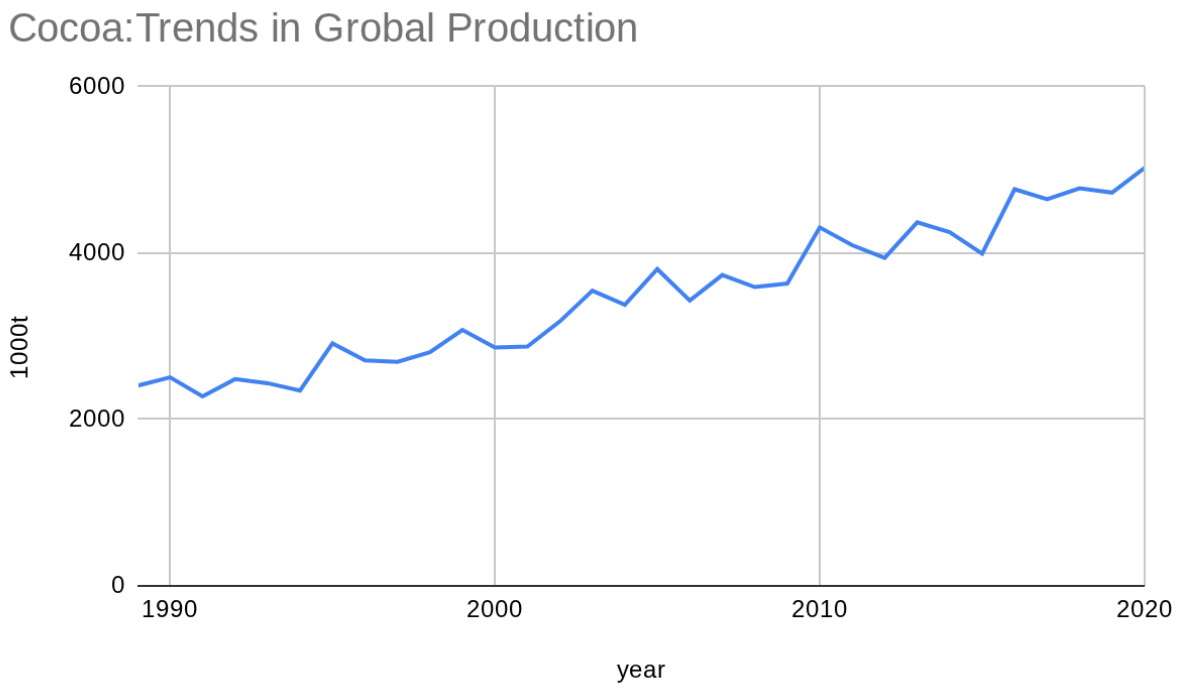
The research method involves planning a trading simulation on a smaller scale. Since

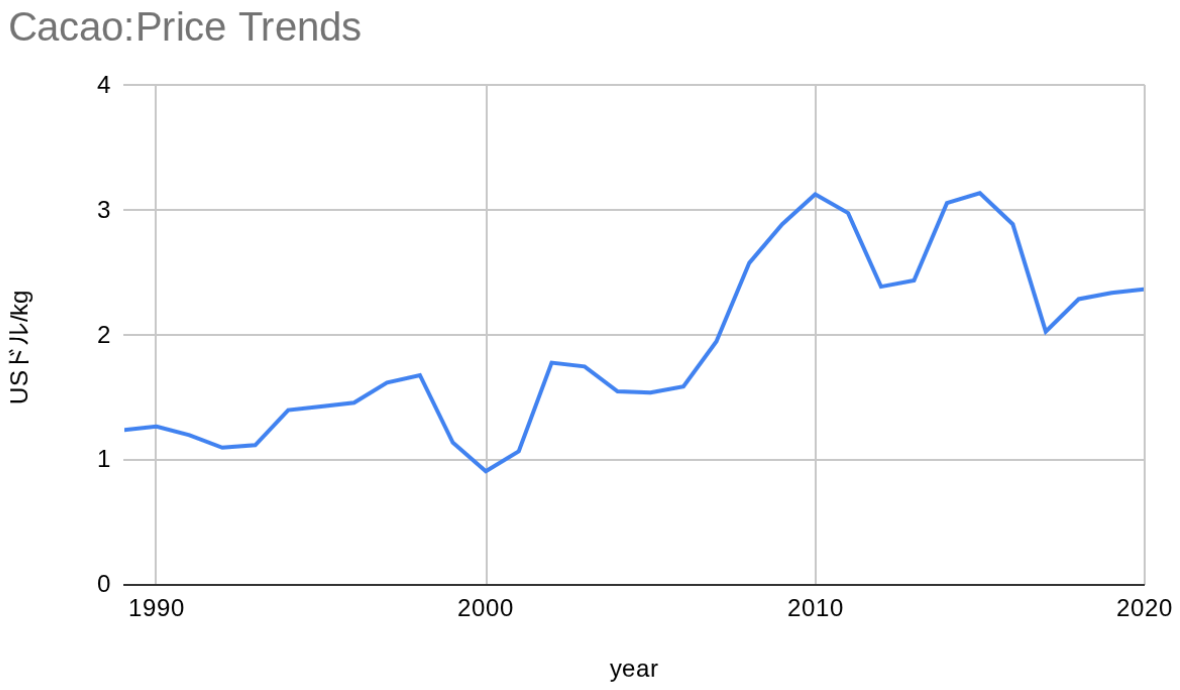
cocoa is the focus of this study, I will investigate the trading patterns of products with similar characteristics and apply these findings to the case of Côte d'Ivoire. One of the features or challenges of primary industry products like cocoa is their price volatility, so I will look at the movements of similar products and how those who sell them manage to make profits, using this information to come up with strategies for selling cocoa. Additionally, I will observe the market trends of these products. The purpose is to track price movements and investigate the reasons behind them, summarizing the cycles of market price changes and their causes. Ultimately, the goal is to implement these findings for cocoa as well.

Another question I have is why, when it comes to countries, they need to handle many types of products, whereas it is common for companies to produce and sell just one product or category. I want to find an answer to this. If we think simply, having fewer types of products should allow for a more efficient production system and easier profit generation, so I want to explore this reality.

3. Results and Discussion

3-1 Results





3-2 Discussion

As shown in the two graphs, the global production of cocoa has continued to increase. However, in years with sudden changes or exceptional increases or decreases, there have also been large fluctuations in prices. This suggests that there is a correlation between cocoa production levels and market prices.

4. Conclusion and Future Prospects

In conclusion, it has been found that there is a correlation between cocoa production levels and market prices. In years when production falls due to factors like climate change, prices tend to rise, while in years with favorable growing conditions and higher production, prices tend to crash. This reveals the instability of production and market prices, which was a major weakness of the monoculture economy.

As a proposal to address this, I would like to suggest the construction of large-scale cocoa storage facilities. The specific goal would be to store part of the harvest in years when production is high and prices are expected to fall, thus preventing an oversupply and price collapse. In years when production is low and prices are expected to rise, the stored cocoa from the previous year could be added to the export, increasing the total export volume and allowing for more efficient profits. Especially in Côte d'Ivoire, which is a major producer of cocoa, this could have a significant impact. By controlling the flow of cocoa, the country could potentially manipulate the market.

Even if a large-scale crop failure occurs and cocoa production cannot be secured, the stored harvest could be exported to guarantee a minimum trade value, providing not just a way to increase profits but also bringing stability to the country's economy.

Moreover, this method of market manipulation is not a selfish approach to prioritize the interests of one country, but rather a strategy that contributes to the global cocoa economy, benefiting consumers as well. By increasing the cocoa production from Côte d'Ivoire during price surges, the global supply would rise, which would eventually cause prices to decrease. This would undeniably contribute to the global economy. Similarly, limiting the export volume during price crashes is a necessary measure to restore cocoa prices to fair levels and, as long as excessive market manipulation is avoided, could also be beneficial to the global economy.

However, one potential issue is whether Côte d'Ivoire has the financial capacity to implement this strategy. As mentioned earlier, Côte d'Ivoire is heavily reliant on a monoculture economy, with cocoa making up a large part of its exports. The problem is that, in the early years of implementing this strategy, part of the harvest would need to be stored instead of being exported. This would lead to a decrease in trade value, creating potential financial deficits, and the additional cost of storage would also add financial burden on Côte d'Ivoire, making it a significant economic risk. Therefore, international economic support or cooperation from large corporations would be essential to make this method feasible.

As for future prospects, I plan to continue researching the new challenges that have emerged and deepen my knowledge about cocoa production techniques. Regarding the proposed cocoa storage technology, I was unable to calculate the specific costs and burdens, and I feel that the simulation lacks certain aspects. I also want to discuss whether increasing profits through this method is effective, considering the costs and workforce involved in cocoa production.

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To eliminate educational inequality

～What We Can Do～

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【To eliminate educational inequality】 5321Takagishi Makoto

Abstract

Poverty is a global issue that must be addressed. One of its contributing factors is educational inequality. In Burkina Faso, the introduction of free education has led to increases in both enrollment and completion rates. It has been found that regions with low literacy rates tend to have higher poverty rates, suggesting a clear link between poverty and education.

We considered how we could be involved in tackling this issue and focused on volunteer activities. We found that there are various types of volunteer work, allowing people to participate in ways that suit their individual circumstances. In the future, online-based volunteering is also likely to become more common. Going forward, it will be important to study what can be done to encourage more people to take part in volunteer activities.

1. Introduction (Background, Significance, and Purpose)

I thought that education is closely related to solving the problem of poverty, so by researching this topic, I aim to consider what I can do to address this global issue.

1-1. Social Context (Current Situation and Problems)

As I live my everyday life, I have learned that there are many global-scale problems in the world. One major issue among them is poverty. While donations and charity activities are often encouraged, I began to wonder what kind of actions I could personally take, and that led me to start this research.

When I studied poverty, I found that there are various causes. These include having low income, not being able to receive education, being involved in conflicts or natural disasters, and lacking farmland or livestock. Many different factors are connected. Since I originally had interest in education, I decided to focus on educational inequality, which is one of the causes of poverty.

Educational inequality creates disadvantages such as being less competitive when seeking employment, which often results in lower income. In addition, families with low income cannot afford to send their children to school, and this again leads to poverty. In other words, solving educational problems can lead to solving poverty, and it is also a necessary element for reducing poverty. Therefore, I believe that studying what we can do to eliminate educational inequality will be meaningful.

【To eliminate educational inequality】 5321Takagishi Makoto

In developing countries, it is said that one out of every five people cannot receive education. Looking at the literacy rate, as shown in the chart on the right, it is clear that developing countries have a lower literacy rate compared to the world average. This means that about one in five people in developing countries are unable to read or write. It is obvious that this puts them at a great disadvantage when seeking employment.

	literacy rate(%)	**literacy rate**(%)
	men	women
In the world	93	91
In the developing countries	81	77

As a premise, what I would like to focus on in this research is the connection to “us.” The ultimate goal is to eliminate educational inequality completely and escape from poverty. However, the purpose of this study is to think about “what we can do” right now. Through this research, I would like to draw a conclusion about what actions we can take.

1-2. Previous Research

First, I investigated an example where education has spread and thus contributed to reducing educational inequality. This case is from the country of Burkina Faso. In this country, the government made public education free for children from the ages of 3 to 16. In some areas, educational activities are also being carried out with support from Japan. As a result of these supports and activities, there have been clear improvements in children’s learning and school attendance. The results are steadily showing progress.

	2010	2016	2019	2023
preschool enrollment rate	2.8%	2.9%	5.2%	6.6%
primary school enrollment rate	74.8%	86.1%	89.5%	74.4%
primary school completion rate	45.8%	57.9%	62.3%	54.6%

As shown in the table on the right, the preschool enrollment rate, school enrollment rate, and completion rate have been increasing year by year. However, in 2023, both the school enrollment rate and the completion rate decreased. The cause seems to be the worsening security situation, which has led to the closure of schools in some areas, negatively affecting children’s access to education.However, it is

certain that making education free has clearly increased the preschool enrollment rate, school enrollment rate, and completion rate.

What can be concluded from this case is that the educational support provided by the government has been effective and has improved students' learning conditions. In other words, educational support may be effective in addressing the problem of poverty.

Even our small efforts can be considered a step toward solving the problem. However, the reason why this activity was able to achieve such significant results is that the government of Burkina Faso and volunteer organizations like UNICEF were heavily involved. Focusing on individuals, it would be nearly impossible for a single person to carry out such a large-scale activity. With this in mind, I considered the direction of this research and formulated my research question.

1-3. Research Question (RQ)

What can be done to ensure that no one is denied access to education?

From previous research, it can be said that providing a well-prepared learning environment can improve school attendance. In addition, descriptions from social trends indicate that better school attendance is related to the problem of poverty. Therefore, drawing a conclusion from this research question could contribute to solving the global issue of poverty.

Image 1 shows the global poverty rate, and Image 2 shows a world map of primary school non-enrollment rates. It is clear that both poverty rates and non-enrollment rates are concentrated in Africa. The same can be said for literacy rates. Looking at the world map showing literacy rates Image 3, low literacy is noticeable in parts of Asia, but the same trend is seen in Africa.

Image1

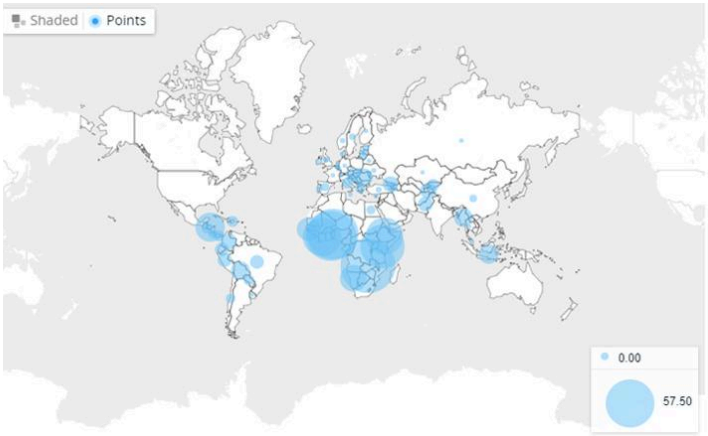

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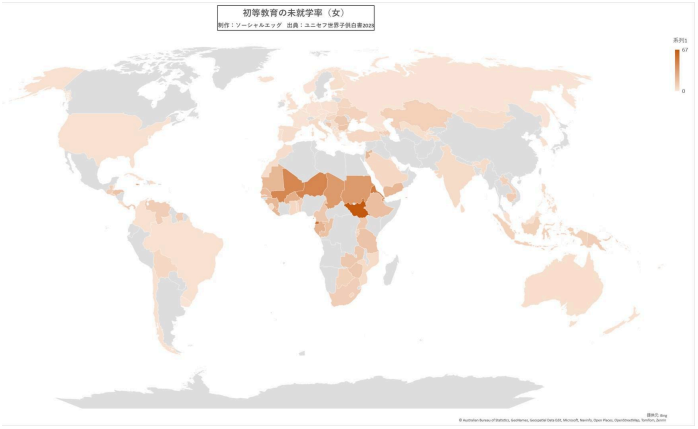
Image2



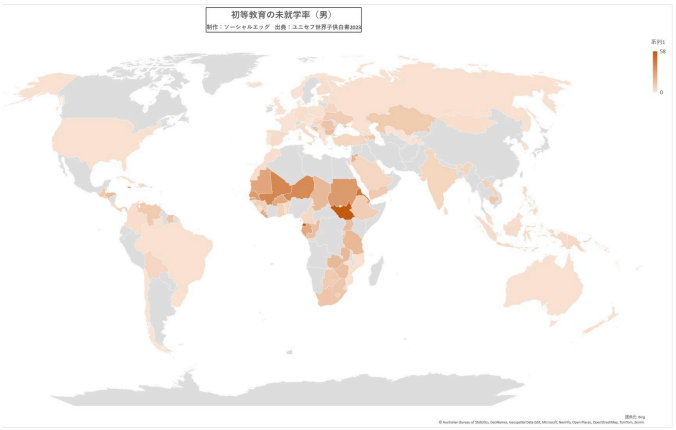
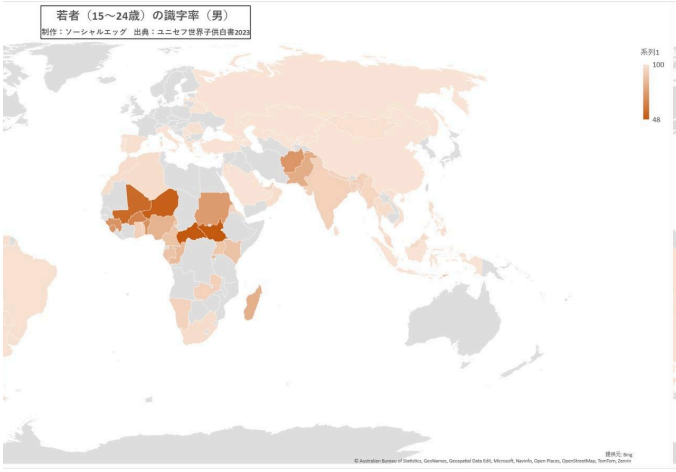
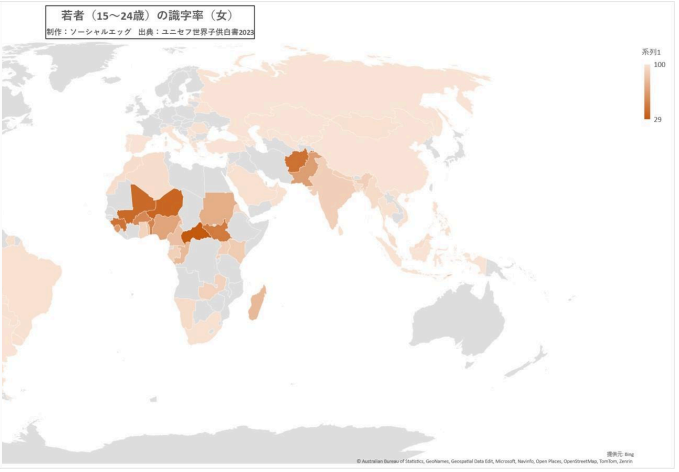


Image3





From these points, it can be said that drawing a final proposal or conclusion for this research question is meaningful.

1-4. Hypothesis

The most familiar way for us to get involved with these issues is through donations or fundraising, but in terms of direct action, volunteering is the most realistic.

Nowadays, fundraising can be seen in many places, such as at store registers or online, and there are many ways to donate. In this research, I focused on ways to get involved other than

donations or fundraising. After investigating other possible methods, I concluded that volunteering is the most practical option.

2. Research Method

I will investigate what kinds of volunteer organizations and programs exist and consider the current conditions under which they operate. I will also examine what benefits they provide.

Next, I will consider the forms that volunteering can take, explore how these activities can be carried out, and draw a conclusion.

3. Results and Discussion

3-1 Results（結果）

First, it is necessary to clarify what volunteer work actually is. When considering volunteer activities related to overseas communities, there are two main approaches:

(1) going abroad and participating in activities as an overseas volunteer, and

(2) contributing to international volunteer work online while staying in Japan.

I have no experience with either of these types of activities. I will focus on these two approaches as I develop my conclusion.

・Educational Support Project for Tanzania

In Tanzania, located in East Africa and classified as a developing country, support for primary school education is urgently needed. Many children grow up speaking their tribal languages as their mother tongue, but the official language of Tanzania is English. English is also used in major industries, making English proficiency a significant factor in employment and an essential skill for escaping poverty.

Volunteers may take charge of classes, assist local teachers, and support lessons not only in English but also in subjects such as physical education and arts and crafts. During the volunteer period, participants stay with a host family living near the project site.

The program accepts university students, working adults, and seniors from around the world. In other words, high school students like us are not eligible to participate. The participation period begins in two weeks. The cost is 306,000 yen for a two-week plan, 351,500 yen for a three-week plan, and 397,000 yen for a four-week plan—an increase of about 40,000 to

50,000 yen as the duration becomes longer. Since this program targets people of university age and older, it is assumed that participants can reasonably afford these costs.

・Cambodia Overseas Volunteer Program

In addition to volunteer work, participants can also enjoy sightseeing. The specific activities—such as volunteering at an orphanage or a Japanese-language school—are assigned according to the participant's preferences. As with the example above, anyone aged 18 or older can join, regardless of nationality. Participants stay at a hotel located near the activity site. What is required for these volunteer activities is mainly the willingness to interact and play with the children; there are no particular language requirements.

The cost for the "SDGs Individual Program" is 80,000 yen for one week (6 nights) and 106,000 yen for two weeks (13 nights), which feels much more affordable compared to the project in Tanzania. For the "Spring/Summer SDGs Study Tour," the cost for one week (6 nights) is 70,000 yen. The participation fee covers accommodation expenses, a local orientation, and on-site support during the stay.

3-2 Discussion（考察）

① Participating in On-site Overseas Volunteer Activities

One form of volunteer work abroad involves traveling to another country through programs organized by NPOs and NGOs. These programs are generally divided into two types: "study tours," which focus mainly on learning about and understanding local conditions, and "volunteer programs," which emphasize direct participation in activities. In most cases, people who engage in overseas volunteering are assumed to have both the financial means and the time to do so. When considering going abroad individually and at one's own expense, I felt that the age groups who can realistically afford this are limited.

However, because overseas volunteer activities typically involve joining projects planned by organizations or groups, I found that concerns I initially had—such as not being able to speak English or anxiety about living abroad—were not as serious as I had imagined. There are many reassuring options, including programs guided by Japanese staff and volunteer opportunities operated by universities.

The duration of volunteer programs also varies widely: from short-term programs lasting one to two weeks, to mid-term programs of three weeks to two months, and even long-term

programs lasting over three months or up to one or two years. Costs differ as well—some programs require several hundred thousand yen, while others are free or available at low cost. It can be said that there is a wide range of choices that allow participants to select programs that match their plans and objectives. This also applies to the choice of destination countries.

Here, based on the issues discussed in *Research Question 1–3*, I investigated volunteer opportunities in African regions, where low literacy rates and high poverty rates are prominent. However, I found that there are actually more volunteer programs available in Asia, Oceania, and the Americas.

There were also various volunteer programs designed specifically for high school students. In this way, I found that overseas volunteer opportunities today come in many forms, differing in duration, location, cost, and eligibility requirements. It became clear that choosing a project that matches the participant's own circumstances is an effective approach.

② Contributing to Overseas Volunteer Activities from Japan Through Online Platforms

By implementing remote-learning and online education programs using ICT, it becomes possible to provide education to students living in distant regions. Online education is also an effective measure for improving the quality of teaching and reducing the burden on educators.

The number of online-based volunteer opportunities is smaller than in category ①, and therefore the range of durations and participation formats tends to be more limited. Many of these activities are also domestic rather than international.

One example is the "Africa Online Children's Cafeteria." This project lasts for six months, with a participation fee of 1,500 yen per month. The program is open to elementary, junior high, and high school students. Testimonials were also shared, many of which mentioned that participants enjoyed talking with children in Kenya and learning about their culture.

For high school students, university students, and working adults, there are also online volunteer programs lasting one week, with costs ranging from 29,800 to 39,800 yen. These are promoted as "future-style volunteer programs." Compared to traveling overseas, the costs are overwhelmingly lower.

In this way, online-based volunteer activities do exist, and I found that the systems supporting them are already well established.

4. Conclusion and Future Prospects

We can make use of the many volunteer programs currently in place to ensure that no one is denied access to education. In Research Questions 1–3, I discussed the relationship between education and poverty. There are limits to what individuals can do, and this is especially true for students. I hypothesized that volunteering is the action each person can take.

After researching, I found that various organizations already have well-established volunteer programs, offering many options in terms of duration, cost, and accommodation. In addition, online volunteer opportunities are available, which allows individuals to find a form of volunteering that suits them.

I believe that online volunteering will become more widespread in the future. Although it is currently referred to as a "future-oriented" method, conducting activities online makes participation easier.

Through this research, I realized that there are far more volunteer programs than I had initially thought. By actually participating, each of us can change our perspective. Many programs also provide personal experiences and testimonials, which can be helpful as references.

5. References

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https://www.cecj.net/program/cambodia/index.html

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https://social-egg.jp/world-gap-in-education-ranking-2023/

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https://www.unicef.or.jp/sfa/report/report_bf.html

A new home life born from Origami

～The Architecture for refugee camps and natural disanter areas

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1. Introduction (Background, Significance, and Purpose)

Housing is one of the most essential needs for human life. However, many people around the world are unable to live safely due to natural disasters, wars, and other crises. In addition, many refugee shelters take a long time to install and assemble, and they are not easy to reuse.

Therefore, this study focuses on foldable housing inspired by origami structures, with the aim of improving living conditions for people in need.

1-1. Social Context (Current Situation and Problems)

Every year, hundreds of people around the world lose their homes due to natural disasters and armed conflicts. Refugee camps and temporary housing often lack durability, comfort, and mobility, and the installation or relocation of shelters requires significant cost and manpower. As a result, it can take considerable time for displaced people to secure adequate housing.

The social issue addressed in this study is the shortage of housing that is immediately usable, low-cost, and easy to reuse.

1-2. Previous Research

Previous studies on temporary housing have looked at many ideas, such as using lightweight materials and portable shelters. Research on origami engineering shows that folded structures can be strong and easy to carry.

On the other hand, 3D-printed buildings are hard to move once they are built, and inflatable tents or shelters are not very durable.

From these problems, it is clear that we need housing that is both durable and easy to transport.

1-3. Research Question (RQ)

RQ: How can foldable, origami-inspired housing improve the transportability, assembly efficiency, and reusability of emergency shelters?

1-4. Hypothesis

A foldable house that uses origami structures can reduce transport volume, shorten assembly time, and improve reusability compared to traditional temporary housing.

2. Research Method

Experiment: Manipulating variables to measure their effect and verify a cause-and-effect relationship.

Statistical Analysis: Applying mathematical models to existing datasets to uncover trends or correlations.

Longitudinal Study: Tracking the same subjects over an extended period to measure changes over time.

Cross-sectional Study: Observing and comparing different groups of subjects at a single point in time.

3-1 Results（結果）

The literature review revealed three major findings:

1. Origami-inspired structures can significantly reduce volume during transportation compared to traditional shelters.
2. Many foldable designs allow for rapid deployment, requiring minimal tools or specialized skills.
3. Reusable materials and folding mechanisms can lower environmental impact by reducing construction waste.
   Studies also showed that designs such as the Miura fold create rigid surfaces that are lightweight yet structurally strong. Meanwhile, portable modular shelters demonstrated that compactness improves delivery efficiency in disaster areas.

3-2 Discussion（考察）

These results support the idea that foldable structures can make housing easier to transport, faster to assemble, and more sustainable.

The study shows that origami architecture can fit between strong but heavy housing and light but weak shelters.

Inflatable tents are easy to move but not very strong.

3D-printed or modular houses are strong but difficult to transport.

Origami structures may offer both strength and compactness.

This approach suggests a new way to design emergency housing by combining traditional folding ideas with modern engineering.

However, more research with real prototypes is needed to check long-term strength and practical use.

4. References

切込を有する折紙の折畳展開機構に関する研究
平坦折り可能なシェルター形式の非可展多面体
KAKEN　—　研究課題をさがす　|　円弧状、渦巻き状ミウラ折りの建築設計への応用 (KAKENHI-PROJECT-23K04113)

Energy Systems in 200 Years: Foundations Required from the Present

5323 Takahasi Kouhei

Abstract

This study aims to examine what types of energy sources will be appropriate for human society 200 years in the future and to propose actions that should be taken in the present to enable their use. First, current energy systems based on fossil fuels, nuclear power, and advanced technologies such as solar power, nuclear fusion, and synthetic fuels are reviewed through previous studies. These analyses indicate that many high-density energy resources are likely to be depleted within the next two centuries or are unlikely to maintain a positive energy balance. Based on this literature review, this study identifies hydropower and biomass power generation as the most realistic energy sources for the future. However, the results also suggest that these energy sources alone cannot support the current level of economic activity and energy consumption. Therefore, it is concluded that future societies will need to significantly reduce their living standards and energy demands.

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1. Introduction (Background, Significance, and Purpose)

Energy supply is one of the most fundamental foundations of modern civilization, supporting industrial activity, transportation, and daily life. However, many of the energy resources currently used by human society are finite and are expected to be depleted within a relatively short time frame. The purpose of this study is to explore which energy systems can sustain human society 200 years from now and to clarify what preparations should be made in the present to enable such systems. By examining energy balance, resource availability, and long-term sustainability, this research seeks to propose a realistic vision of future energy use.

1-1. Social Context (Current Situation and Problems)

Today, global society faces serious energy challenges. It is widely estimated that oil will be depleted in approximately 50 years, natural gas in about 60 years, and coal in around 130 years. Despite efforts toward decarbonization and the promotion of renewable energy under initiatives such as the SDGs, these measures alone are unlikely to fully replace fossil fuels. Nuclear power is often proposed as an alternative; however, its fuel source, uranium, is also expected to be depleted within roughly 170 years. Even emerging technologies such as nuclear fusion rely on scarce materials such as lithium. As a result, humanity must

reconsider its dependence on high-density energy resources and explore energy systems that can be maintained over much longer time scales.

1-2. Previous Research

Previous studies have examined several potential alternatives to fossil fuels. Research on solar power generation, such as reports by the International Energy Agency (IEA), has introduced the concept of Energy Payback Time (EPBT), which estimates how long it takes for a photovoltaic system to recover the energy invested in its production. Although some studies suggest that solar panels can recover their energy within approximately three years, these calculations often exclude indirect costs such as infrastructure maintenance and human labor.

Nuclear fusion has also been studied as a future energy source. Current fusion research mainly focuses on deuterium–tritium reactions; however, tritium is extremely rare in nature and must be produced using lithium. Since lithium itself is a finite resource, nuclear fusion cannot be considered a fully sustainable solution over a 200-year horizon.

In addition, synthetic fuels have been promoted by governments as a way to recycle carbon dioxide from thermal power plants. Nevertheless, because thermal power plants operate at an efficiency of about 40 percent, synthetic fuel production ultimately results in a net energy loss. Therefore, previous research suggests that many advanced technologies face fundamental limitations in terms of long-term energy balance.

1-3. Research Question (RQ)

The central research question of this study is: *If current civilization levels cannot be maintained, to what extent must human living standards be reduced?*
After all easily usable, high-density energy resources such as oil, coal, and natural gas are exhausted, it is essential to determine what types of energy humans can rely on and how much energy these sources can realistically provide. This question is critical for understanding the future structure of society and economic activity.

1-4. Hypothesis

This study hypothesizes that an energy system centered on hydropower and biomass power generation will be the most appropriate for human society 200 years in the future. Hydropower is expected to remain viable due to its long operational lifespan, high energy output relative to scale, and reliance on materials that are less likely to become scarce. Biomass power generation is also considered suitable because it can utilize waste products generated by human daily life, such as food waste and human and animal excreta, to

produce methane gas. Together, these energy sources are expected to form the core of a sustainable, though lower-energy, future society.

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2. Research Method

This research adopts a literature-based comparative analysis. First, key requirements for a sustainable energy system in 200 years were identified, including positive energy balance, low dependence on scarce resources, and limited labor requirements. Next, existing and proposed energy generation methods were examined using reports from international organizations and government publications. These methods were then evaluated based on their long-term feasibility, resource availability, and energy efficiency. Finally, the suitability of each energy source for future society was assessed in relation to the research question and hypothesis.

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3. Results and Discussion

3-1. Results

The literature review revealed several important findings. Energy systems suitable for the distant future must maintain a positive energy balance and require relatively small numbers of workers per unit of energy produced. Systems that rely on rare minerals or fuels are likely to become unsustainable within 200 years. Hydropower was found to generate large amounts of electricity relative to its scale and to rely mainly on abundant materials such as iron, cement, and soil. Biomass power generation was identified as a method that can continuously produce energy from human and agricultural waste, making it less dependent on finite resources.

3-2. Discussion

These results support the hypothesis that hydropower and biomass power generation are suitable core energy sources for the future. Hydropower can be interpreted as a form of “compressed” solar energy, similar in principle to fossil fuels, as it uses the solar-driven water cycle to concentrate energy in reservoirs. Biomass power generation similarly relies on solar energy stored through biological processes. However, unlike fossil fuels, these systems do not provide energy in sufficient quantities to maintain current consumption levels. Therefore, the findings suggest that future societies must adapt by reducing energy demand and restructuring economic and social activities accordingly.

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4. Conclusion and Future Prospects

This study concludes that hydropower and biomass power generation are the most realistic energy sources for human society 200 years in the future. However, these sources alone cannot satisfy the energy demands of modern civilization. As a result, future societies will likely experience significantly lower living standards and reduced economic activity. Understanding how people will live under such conditions remains an important topic for future research. Further studies should examine concrete models of daily life, social systems, and economic structures that are compatible with low-energy societies.

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AI Literacy

~ Education in Developing Countries ~

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Abstract

This research examined AI literacy education in developing countries that have enough infrastructure and Internet access. AI literacy includes the knowledge of how to use AI, information ethics, and the ability to avoid risks. However, since there are many challenges to this education in developing countries, methods should be based on local characteristics. Further discussion about financial support and application to other regions is necessary.

1. Introduction

1-1. Social Context

In recent years, artificial intelligence (AI) has made remarkable progress, including developments in deep learning and the emergence of generative AI. Applications of AI are explored in various fields, and it is expected to have a greater impact on our daily lives.

This widespread use of AI poses challenges. One of the problems is the difficulty in making use of AI or understanding when to use it. Users may struggle to use it. Considering that current AI is clearly not perfect, it is necessary to acquire “AI literacy”, the ability to use AI effectively.

1-2. Previous Research

According to Sato (2019), AI literacy can be divided into two categories: “knowledge and understanding of AI” and “thinking and judgment skills for using AI appropriately”. In particular, the latter is considered “a universal skill required not only for using AI but also for general problem-solving”. It is stated that such knowledge and skills can be developed through appropriate education.

1-3. Research Question

While the importance of AI literacy is common globally, this research focuses on developing countries where the rapid introduction of AI is anticipated. Specifically, the research targets areas where basic infrastructure, such as electricity and telecommunications, is established and basic education is provided. The reason for this is to separate challenges at least necessary for AI literacy education (infrastructure and fundamental education) from this research and focus on the education itself.

Therefore, the research question is “What kind of education should be provided so that more people in developing countries can acquire AI literacy and use it effectively?” Improving AI literacy is expected to enable those in the regions to have more comfortable lives.

1-4. Hypothesis

Education in developing countries faces various challenges, such as financial shortages and low-quality infrastructure, which may have a negative impact on education. Therefore, I

believe that AI literacy education can be more effective by methods adapted to the local environment, instead of applying existing systems used in developed countries.

2. Research Method

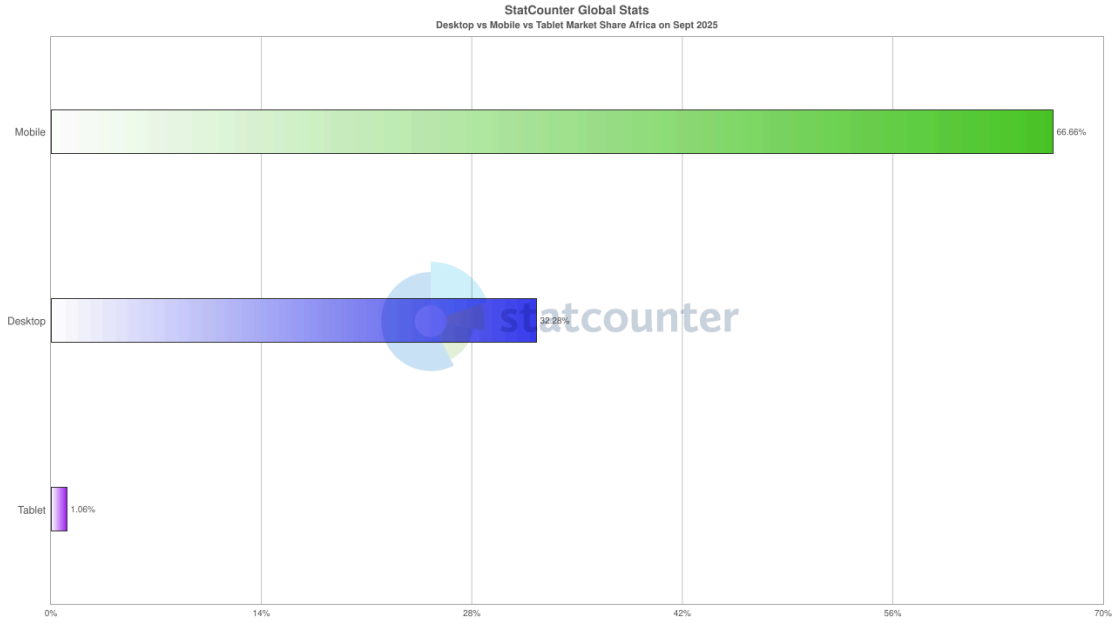
(1) Conduct a literature review on AI literacy and examine elements necessary for AI literacy education.
(2) Analyze the current situation and challenges in education in developing countries through a literature review.
(3) Consider how to spread AI literacy education and how to overcome the challenges in developing countries.
(4) Based on (1)-(3), suggest an answer to the research question.

3. Results and Discussion

3-1. Results

As a result of this research, it was clarified that there were three essential elements for AI literacy education. The first one is the knowledge required for AI users, including understanding that AI is not perfect. Sometimes it says incorrect things. The second is information ethics. This skill is not limited to AI but is important in many situations in the current technologically advanced society. The third is the ability to avoid risks. Now crimes using AI, such as fraud, are increasing, so it is necessary to strive to avoid them. Especially in developing countries, individual skills are important, because as usual legal systems and public support are not enough compared to other nations.

Furthermore, regarding infrastructure conditions in developing countries, regional differences were found. For example, in Africa, mobile devices are more widespread than other digital devices.



Statcounter Global Stats (2025) Desktop vs Mobile vs Tablet Market Share in Africa - September 2025

Regarding the timing of AI literacy education, Yeter et al. (2024) point out that people can become accustomed to AI earlier by introducing AI-related education in primary education.

3-2. Discussion

Based on the results, I discussed education in developing countries. First, about the content of education, the three elements mentioned above should be emphasized.

To foster AI literacy effectively, the timing of education is also important. As Yeter et al. (2024) pointed out, opportunities to interact with AI as early as from primary education are useful for mastering AI in the future. Therefore, AI literacy education should be introduced into school curriculums including primary education.

However, many difficulties are expected in AI literacy education in developing countries. To solve these issues, I believe that utilizing AI itself as a means for AI literacy education is effective and innovative. It can lessen educational divides and reduce the burden on teachers. In addition, education should be a form suitable for each region. For example, using mobile devices for AI literacy education is effective particularly in regions where they are the most widespread of other devices, such as Africa.

4. Conclusion and Future Prospects

In conclusion, developing countries should positively introduce AI literacy education into school education. Additionally, the effectiveness of this education should be developed by utilizing technologies such as AI and establishing methods suitable for each region.

However, financial challenges are expected in this education. For example, it requires expenses for developing teaching materials and gathering a minimum number of teachers. Therefore, discussion on the financial support from developed countries is necessary. Also, since some of those in developing countries don't understand the importance of education very much, awareness should be improved. Furthermore, though this research focused on developing countries which have enough infrastructure, expanding to areas without such infrastructure have not been discussed. In such areas, basic education and infrastructure development must be prioritized before AI literacy. Therefore, applying this research to those regions is not easy.

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Education for All

～ Multi-faceted Solutions for Primary Education in South Sudan and India: Including the Application of Japanese-Style Education～

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Currently, one in eleven people are not receiving primary school education. South Sudan has the lowest education rate, while India has the highest number of people without education in the world. This research aims to spread primary school education, focusing on South Sudan and India. To achieve this, we will conduct research from various angles, but we also hope to incorporate the expansion of Japanese-style education overseas

1. Introduction (Background, Significance, and Purpose)

The purpose of this research is to promote the spread of education globally. However, educational circumstances vary greatly depending on the region. Therefore, to conduct a concrete analysis, this study focuses on primary education in South Sudan and India.

The motivation behind this research comes from my interest in education and a strong desire to improve the current critical situation. This study aims to contribute to the expansion of education and help reduce inequality among people.

Education nurtures people's minds and can also contribute to world peace. In this way, this research can help achieve multiple Sustainable Development Goals (SDGs).

1-1. Social Context (Current Situation and Problems)

The current state of education around the world is a serious situation. In 2021, 9% of children aged 6 to 11 were not attending school. This is about 67 million children, or one in eleven.

Specifically, South Sudan has the highest percentage of children not attending primary school at 62%. This is followed by Equatorial Guinea (55%), Eritrea (47%), and Mali (41%). Sub-Saharan Africa has the largest number of children who cannot receive school education. It is also the only region where this percentage is increasing. Since 2009, the number of out-of-school children (aged 6 to 17) has increased by 20 million. It reached 98 million by 2021.

The top 10 countries with the highest number of children out of school are India, Pakistan, Nigeria, Ethiopia, China, Indonesia, Tanzania, Bangladesh, the Democratic Republic of the Congo, and Sudan.

1-2. Previous Research

Previous studies have been conducted by organizations such as UNICEF, UNHCR, the International Movement Against All Forms of Discrimination and Exclusion (IMADR), and EDU-Port Japan.

According to UNICEF's investigation into the current state of education, South Sudan has the highest percentage of children who cannot attend primary school. In terms of total numbers, India has the largest population of children out of school.

According to UNHCR, many people in South Sudan have been forced to flee their homes due to spreading conflict, extreme poverty, hunger, and natural disasters like flooding caused by climate change. Furthermore, following the 2023 conflict in neighboring Sudan, many South Sudanese refugees who were living there have been forced to return home.There are over 2,286,900 refugees and asylum seekers.More than 173,100 people have fled the conflict in Sudan.Over 603,200 South Sudanese refugees were forced to return from Sudan.

Although South Sudan became the world’s newest nation in 2011, ethnic conflicts broke out in 2013, leading to a civil war. Since 2016, tensions have remained high, creating one of Africa’s largest refugee crises. Refugees are being hosted in poor communities in neighboring countries like Uganda, Ethiopia, and Kenya, which has put a heavy strain on aid activities. In August 2024, a famine was declared in parts of Sudan, and the spread of cholera has further endangered the lives of women and children. UNHCR is providing essential items (water, food, blankets), health services, and protection for victims of violence.

In India, research by IMADR shows that the caste system remains a major barrier to education. People outside the caste system, known as Dalits, as well as indigenous groups and religious minorities (such as Muslims), are marginalized.

A 2015-16 report titled "Exclusion in Schools" revealed the following:

Educational Gap: While the government made education free and compulsory in 2009, the quality of public schools where most Dalit children go is poor. Although the government target for education spending is 6% of GDP, only about 3% is actually used.

Discrimination and Violence: Many Dalit and minority students drop out due to discrimination. This includes direct discrimination and physical or sexual violence. In some cases, teachers justify this violence as "discipline," but it has led to serious crimes and even the deaths of students.

Finally, EDU-Port Japan is a project that promotes "Japanese-style education" overseas through cooperation between the government and the private sector. This includes high academic standards, disciplined habits, and quality math, science, and ICT education.

The project has three main goals. First, it aims to improve the quality of education by enhancing international curriculums and developing the skills of teachers. Second, it focuses on international cooperation to build better relationships with other countries and contribute to the SDGs. Finally, the project supports economic growth by helping Japanese education companies expand overseas and training human resources who can work for Japanese companies abroad.

1-3. Research Question (RQ)

Research Question is
“How can primary education be expanded in South Sudan and India?”

1-4. Hypothesis

In South Sudan, a multi-faceted approach is necessary. This includes improving the quality of teachers and school facilities, ensuring community safety, overcoming prejudices against families and girls, and reforming the educational system.

In India, it is essential to work steadily toward the complete abolition of the caste system. To achieve the goal of breaking down this system, international organizations must play a crucial role.

Furthermore, the overseas expansion of Japanese-style education should be promoted, as it provides significant benefits to both Japan and the rest of the world.

2. Research Method

The research is done by getting information mainly from previous researches and organizations like UNICEF and considering the answer to the research question and the solution based on them.

3. Results and Discussion

In this study, I first examined the validity of promoting education in conflict-affected areas. During the mid-term presentation, it was suggested that "ensuring safety should be a higher priority than education." However, my research led to the conclusion that maintaining education is essential precisely because of the conflict.

Conflict and disasters change children's lives instantly and can deeply scar their physical and mental development. However, providing a "protected environment" through schools helps shield children from dangers such as abduction, exploitation, and recruitment by armed groups. Furthermore, schools do more than just teach hygiene and self-protection; they serve as a "healing space" where children can regain a sense of "normal daily life" through interaction with friends and mental care. While children are at school, parents can also focus

on rebuilding their lives. In the short term, education works as emergency aid, and in the long term, it is indispensable for raising the next generation to rebuild society.

Regarding the departure from the caste system in India, I initially focused on the leadership of international organizations. However, considering concerns about "interference in domestic affairs," I have shifted my policy to a "grassroots approach," starting steadily within local communities. I found that this issue has many similarities with the "Buraku discrimination issue" in Japan. By studying the history of people who have faced discrimination in Japan, I want to explore how education can help eliminate such discrimination.

To test my hypothesis about the overseas expansion of Japanese-style education, I analyzed an article by the Embassy of Ghana in Japan. The results confirmed that Japan and Ghana can learn from each other, making the introduction of Japanese-style education highly beneficial.

Benefits from Japan to Ghana: Student-centered "interactive teaching methods," "moral education," and "extracurricular activities" contribute to the holistic growth of students and increase their motivation to learn. Additionally, the Japanese focus on "discipline" and "respect for others" is likely to improve the overall school environment in Ghana.

Learning from Ghana to Japan: On the other hand, Japan has much to learn from Ghana. In particular, their strong "community involvement in school management (such as PTA activities)," "inclusive education" for marginalized groups, and "life skills education" to build "resilience" provide excellent hints for solving educational challenges in Japan.

Based on these findings, the expansion of Japanese-style education should not be a "one-way push" of Japanese methods. Instead, it should be a "two-way learning process" through teacher exchanges and adapting the curriculum to the local context. Specifically, establishing pilot schools and involving local communities will lead to sustainable educational support.

Through a literature review, I found that interventions focusing on improving teaching methods and enhancing school governance and teacher accountability are highly effective. On the other hand, material investments, such as building schoolhouses or distributing textbooks, often do not necessarily lead to an improvement in educational outcomes.

4. Conclusion and Future Prospects

In South Sudan, I propose a comprehensive approach focused on four main pillars: (1) expanding educational resources such as teachers and facilities, (2) ensuring community safety, (3) improving the home environment to eliminate gender bias, and (4) fundamentally reforming the educational system.

Specifically, in terms of infrastructure, we should not only build new schools but also install

water supply systems for clean water, separate toilets for boys and girls, and underground shelters for emergencies. Regarding the "soft" aspects of education, it is essential to improve teacher training and establish a national certification system. This training should cover various areas, including child psychology, counseling, and the use of ICT. Furthermore, I suggest introducing a "class teacher system" for lower primary grades. Through this system, teachers can conduct individual interviews and home visits to inform parents about the importance of education, especially for girls. For complex issues, a support system should be established where teachers collaborate with professional counselors and school infirmaries. Finally, making primary education compulsory and reducing educational costs will lower the barriers to school attendance.

These activities require international cooperation. To secure funding, I propose two ideas. First, we should promote donation activities, such as street fundraising and charity events led by students in developed countries. Second, I suggest a "self-reliance support" model based on Japanese agricultural high schools. Students would sell their products abroad through fair trade, and the profits would fund the school. This is not just about money; it provides practical education that fosters "initiative" and "teamwork." However, it is a strict requirement that these activities are conducted safely as part of education to avoid any form of child labor.

In India, to eliminate discrimination based on the caste system, I propose a "three-part reform" consisting of Education, Support, and Penalties, referring to the history of the "Buraku discrimination issue" in Japan. First, schools must thoroughly teach students that discrimination is unjust. Second, the government should strengthen its support offices to provide financial and psychological assistance to those in need. Third, penalties for discriminatory acts must be made stricter, and a safe system for victims to report abuse must be built immediately. Ending discrimination cannot be achieved overnight; it is essential for the government, international organizations, and the people involved to work together steadily.

As a common strategy for both countries, I promote the introduction of "Japanese-style education." Specifically, this includes morning and afternoon "Home Room" sessions (for greetings and health checks), school lunches, cleaning activities, and extracurricular clubs. In South Sudan, school lunches would be extremely effective not only for improving children's health but also as a motivation to attend school. It is important to continue and develop the efforts of "EDU-Port Japan," and I strongly urge the Japanese government to increase the budget for this project.

By implementing these measures, I am confident that the current educational situations in South Sudan and India will improve, allowing many children to secure a brighter future. I hope that the proposals in this study will spread globally, leading to a day when every child can receive an education. I am committed to continuing my research on this issue.

The first step we can take in our daily lives is to stop viewing these challenges as "someone else’s problem" in a distant country. Even small actions—such as making a modest donation,

participating in volunteer work, or researching and raising awareness among those around us—can make a difference. These proactive steps will surely become a powerful force that changes the world.

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Improving School Education Outcomes in Developing Countries: Evidence, Knowledge Gaps, and Policy Implications
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How to build roundabouts work effectively?

~between the city and the countryside~

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Abstract

Introduction

Today, there are many social and environmental issues around the world. Roundabouts are one of the ways to solve these issues: CO2 emissions, traffic accidents, traffic jams, and so on. However, they are only built in Europe, Australia, and America. They should be built more and more around the world.

How to research

Previous researches, simulate with AI

1. Introduction (Background, Significance, and Purpose)

One day, I found out about roundabouts in Australia. I haven't ever seen it before, so I was surprised by the fashionable system, and I want to spread them around the world.

1-1. Social Context (Current Situation and Problems)

Roundabouts are intersections. They can help to solve many issues; traffic jams, CO2 emission, accidents, and so on. However, they are only built in Europe, Australia, and America. That's too few.

Also, it is difficult to build them effectively. If it was built in the city, it would cause a traffic jam. On the other hand, in the countryside, it would cause traffic accidents because many people don't know how to go through a roundabout.

1-2. Previous Research

https://www.sciencedirect.com/science/article/abs/pii/S0925753524002510

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1-3. Research Question (RQ)

How to build roundabouts more effectively

1. Are roundabouts really better than regular intersections?
2. Where should new roundabouts be installed?

1-4. Hypothesis

1.This has already been proven by researchers around the world

2. China, Saudi Arabia, South Africa

2. Research Method

Internet, literature

3. Results and Discussion

We had hypothesized that western China would be suitable for installation, but since China constantly optimizes traffic flow using AI technology and its roads typically have three to four lanes in each direction, even the western regions—which are less developed than the east—already have well-established infrastructure. Consequently, we concluded that these areas were not suitable for the installation of new roundabouts, and our hypothesis was not validated. I also considered oil-rich nations such as Saudi Arabia and South Africa, but the roads that met the criteria were either straight or experienced drastic fluctuations in traffic volume depending on the time of day. Consequently, I concluded that these locations were also unsuitable for installing new roundabouts, and the hypothesis was not validated.

3-1 Results

When we examined the cities corresponding to LOS A through C, we found that, in addition to Europe, North America, and Australia—where many roundabouts have already been installed—Asian regions such as Indonesia and Malaysia were also listed. I then conducted a detailed investigation into Indonesia and Malaysia, which met the criteria. In Indonesia, infrastructure is still under development, and dangerous motorcycle driving is cited as a major traffic issue, with aggressive lane-splitting and the use of sidewalks and bike lanes posing significant problems. Meanwhile, Malaysia, like Indonesia, has a high incidence of dangerous motorcycle driving. Livestock also sometimes crosses the road. In some areas, roundabouts have already been introduced as an alternative to traffic lights.

3-2 Discussion

In this study, Malaysia was deemed unsuitable for the installation of new roundabouts. In Indonesia, however, since reports indicate that roundabouts reduce accidents involving pedestrians and cyclists, their installation is considered effective from the perspective of preventing accidents caused by reckless motorcycle driving.

Next, we will examine the challenges. Since the countries selected for installation had already taken into account challenges related to installation (such as land area and traffic volume), these factors are excluded. Therefore, the primary challenges cited are those arising after installation, specifically regarding public awareness of how to navigate roundabouts; education at driving schools is considered an appropriate solution. In Indonesia, the driver's license ownership rate is low—approximately 6% for motorcycles and 16% for cars—and a certificate from a driving school became mandatory in 2023. Consequently, it is anticipated that the number of driving schools and trainees will increase, and it can be concluded that this solution will effectively raise awareness among future trainees. However, since this method

cannot reach drivers who already hold licenses, it is necessary to consider alternative solutions.

Furthermore, I learned that infrastructure is designed and implemented to suit the local conditions, so it is not appropriate to introduce new systems indiscriminately.

4. Conclusion and Future Prospects

1. Research specific place names

2. Consider specific training guidelines at driving schools and how to interact with licensed drivers.

5. Reference

都市部におけるラウンドアバウトの大規模利用が安全性、時間消費、環境に与える影響：事例研究

The effects on safety, time consumption and environment of large scale use of roundabouts in an urban area: a case study, Christer Hydén, András Várhelyi, January, 2000

Quality Education For All

~To provide education to children in poverty~

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Abstract

The target of this research is children under 18 suffering from educational inequality. The purpose is to improve the percentage of students advancing to college of children in Africa. I focused on SDGs 4, whose goal is to correct the inequality between gender in education, to make conditions that children can study the necessary knowledge and skills to create sustainable society, and so on. I especially paid attention to the goal, which is to make children study fairly for free. I gathered information on the internet and articles, and I thought that using devices for studying is the best way to solve the problem. However, many problems, for example, the cost of introduction, infrastructure, and environment of the internet, raised. So I suggested the effort to imitate HECS which is being carried out in Australia. From now on, I want to think about the issue for the effort, and activities which we can do right now such as volunteer work.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

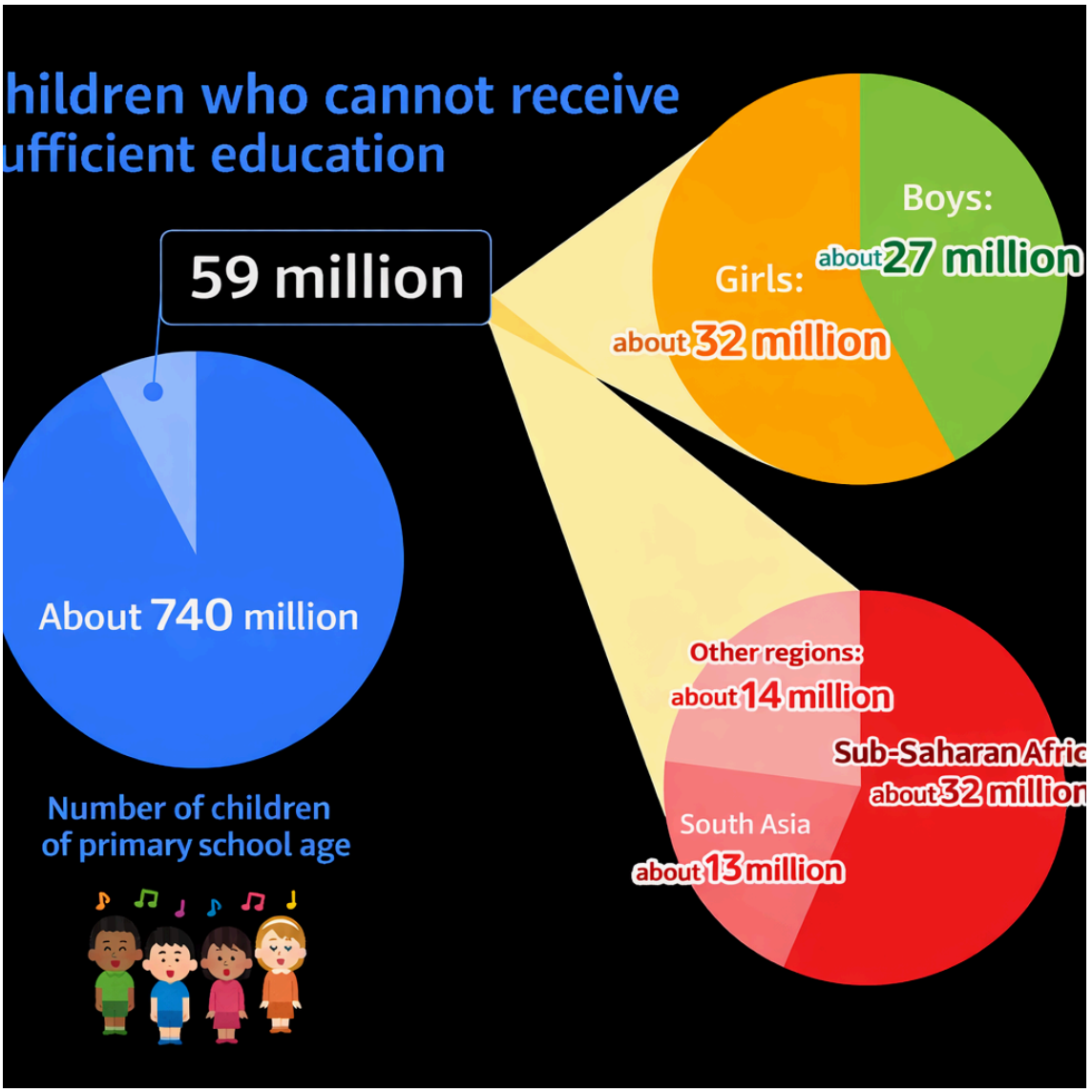
(1) Cause
(2) Problems
(3) Support to Developing Countries and The Results
(4) What We Can Do

(1) Cause

These days, a lot of people are concerned about educational inequality. About one-fifth of children in developing countries including South Sudan, Uganda, and Bangladesh cannot go to school. Also, there is inequality between genders.

① Income Defferentials

A lot of children cannot go to school because of the economy. The parents didn’t get enough education, they couldn't earn money, so they put off education.



② The Shortage of Schools and Teachers

The shortage of schools and classes within the number of children is one of the reasons why children cannot receive education. Additionally, treatment for teachers is bad, so there is no one who wants to be a teacher. Also, teachers appear in the educational setting before getting sufficient skills, therefore it is difficult to provide quality education. Furthermore, there are few teachers who can understand the local language.

③ War

Schools may be the base of the army and be the target of attack. Also, children who lose their course by dropping out of the school sometimes want to join the armed group. It will put children at risk of child marriage, human trafficking, sexual exploitation, sexual violence, and so on.

④ Religion, Regional Characteristics

There are a lot of girls who can get enough education because of the values or the customs that took root in the religion and region since ancient times. For example, if a community believes that girls who do unpaid care work do not need education, girls cannot go to school

even if they want to. Also, as in point ①, in families with little money, education for boys is often chosen before education for girls. In addition, girls face many dangers such as child marriage, early pregnancy, and violence on the way to school. Some schools do not have toilets, so it is very hard for girls who have their period to attend school.

⑤ Political instability

In countries affected by war, unstable politics has a bad influence on education. When politics are unstable, the economy also becomes weak. As a result, public services such as roads, schools, and education cannot be provided well in some areas.

⑥ Natural disasters

In countries and regions where natural disasters such as droughts and floods happen often, normal support systems do not work well. This makes social inequality and unfairness more serious. These problems greatly affect children's chances to go to school. Poverty caused by natural disasters leads to educational gaps, so dealing with natural disasters is also an important issue.

I think income inequality is the biggest problem. Because families do not earn enough money, children cannot receive education. Because they do not receive education, they cannot get well-paid jobs. If this continues, educational inequality will never disappear.

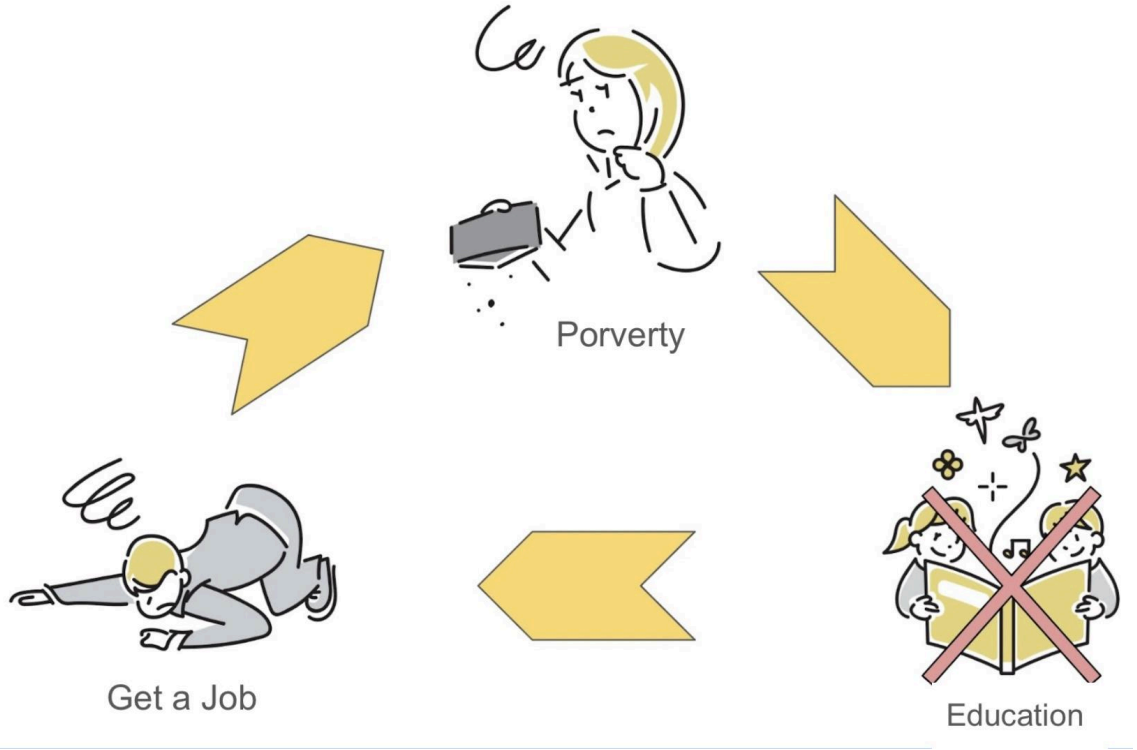
(2) Problems

Educational inequality causes problems such as not being able to read, write, or do basic math. This makes it difficult to get a stable job and can cause people to be left out of society. Not being able to use a person's talents and abilities is a loss for both the individual and society, and it is unfair.

Literacy can be seen through literacy rates. Around the world, literacy rates are increasing, but in developing countries, about one in five people grows up unable to read or write. Reading and writing are necessary not only for jobs but also in daily life, so low literacy rates are a serious problem. As shown in the graph, Chad has the lowest literacy rate, with 35.4% for men and 18.2% for women. This shows not only low literacy rates but also gender inequality in education (Graph 5).

As shown in the graph, the literacy rate in many countries in Asia and Europe is over 90%. However, in Africa, even the highest rate is around 80%. This clearly shows the educational gap in the world.

From this, we can see that educational inequality affects not only one generation but also the next generation. As shown below, a negative cycle continues.



I focused on income inequality because I felt that this negative cycle must be stopped. In order for children to receive education even if it costs some money, it is important to create a situation, even temporarily, where children can receive education without money. If such a situation is created, it can lead to higher employment rates, increased income, reduced income inequality, and finally reduced educational inequality.

(3) Support for developing countries and its results (World Vision)

① Improving the quality of education

To improve the quality of education, the quality of teachers is very important. There is an example where support was given to build housing for teachers in order to attract good teachers. This support was provided in the Ngerengere area of Tanzania. Because Ngerengere is far from cities, many teachers did not want to work there. However, after teacher housing was built, more teachers wanted to work in the area. As a result, the school enrollment rate increased from 5% in 1995 to 98% in 2018, and more students were able to go on to university.

② Reducing gender inequality in education

World Vision works to raise awareness about the risks of early marriage and the importance of education for girls. Many girls give up going to junior high school because it is far from their homes. To solve this problem, World Vision built dormitories for girls near junior high schools so that they do not have to give up continuing their education.

③ Educational support for children

World Vision runs a program called Child Sponsorship. This program supports children by improving the environment needed for healthy growth. The goal is for supported children to grow up and support their own communities in the future. Examples of support include building wells, water tanks, and toilets at schools. We can also support this program by making donations.

(4) What we can do

① Donations

・Regular donations

This is a method of donating a fixed amount every month. Because people can choose a small amount, such as 1,000 yen, it is important to choose an amount that can be continued without difficulty.

Examples include credit cards, bank transfers, convenience store payments, and postal payments.

・One-time donations

If regular donations are difficult, people can make one-time donations.

・Donating money by selling books or CDs

Unused books, CDs, or DVDs can be sold, and the money can be donated. This is also better for the environment than throwing them away.

② Volunteering

People can take part in volunteer activities such as fundraising or raising awareness of educational issues.

For example, there are programs where students teach Japanese overseas. These programs are for students aged 16 to 30 who are interested in education or international issues, and some are held in places like Cebu Island in the Philippines.

③ Sharing information with others

To help as many children as possible, it is important to understand the problem and tell others about it. By sharing information, the number of people who support educational aid may increase.

1-2. Previous Research

A paper written by a researcher at Kagawa University focused on educational inequality in

Japan. As mentioned before, not only in Japan but also around the world, people's future jobs are often decided by the family they are born into. Even people who work hard may not be given equal chances. The paper also mentioned causes of educational inequality such as differences in access to higher education, scholarships, and the heavy financial burden on families.

The paper also discussed problems and solutions in higher education around the world.

① The United States

In the United States, the most important issue in education policy is equal access to education. One reason is the high cost of tuition. To deal with this, scholarships and student loans are provided. However, it is said that scholarships have a bigger influence on access to higher education than tuition itself.

② The United Kingdom

In the United Kingdom, equal access to education is also a problem. Tuition fees became three times higher in 2006 and increased again in 2010. Because of this, universities are required to provide their own scholarships.

③ Australia

In Australia, a system called HECS was introduced in 1989. Students do not pay tuition while they are studying, but they pay it after graduation. This is a very unique system. Research shows that this system did not have a very large effect, but it helped reduce barriers to higher education.

1-3. Research Question (RQ)

Is learning using digital learning devices effective in reducing educational inequality?

In developed countries including Japan, digital learning devices are becoming more common. Students can learn about space or the ocean using VR, or study cells and history through videos. These tools are useful for improving academic skills and gaining experience.

However, there are also problems, such as weaker writing skills and poor eyesight caused by long hours of screen use.

1-4. Hypothesis

Hypothesis ①: Paying tuition after graduation is effective in reducing educational inequality.

This is based on the Australian HECS system. It allows children from poor families to receive education and may lead to higher employment rates and reduced income inequality.

Hypothesis ②: Learning with digital devices is difficult unless many conditions are met.

Reasons include low internet access in sub-Saharan Africa, low literacy rates, lack of IT skills, and health problems caused by long screen time.

Hypothesis ③: Building teacher and student dormitories near schools leads to equal educational opportunities.

This is based on examples where enrollment rates increased after dormitories were built.

Hypothesis ④: Building toilets has a positive effect on education.

Some children, especially girls, give up school because there are no toilets.

2. Research Method

This research was conducted using the internet. It focused on definitions of educational inequality, current policies, digital learning, economic support, and education policies in developed countries.

3. Results and Discussion

3-1 Results（結果）

From the research, several findings became clear.

First, introducing digital learning devices is difficult in many developing countries. The cost of devices is high, and internet access is limited in some areas. In addition, low literacy rates and lack of IT skills make it hard for students to use these devices effectively. Health problems such as poor eyesight also make long hours of study difficult.

Second, building toilets at schools is important but not easy. In areas without proper infrastructure, such as water and sewage systems, building and maintaining toilets requires advanced technology and high costs.

Third, paying tuition after graduation is a possible way to reduce educational inequality. This system allows students from poor families to receive education without worrying about money while they are studying.

Finally, building dormitories for teachers and students near schools has shown positive results. In some areas, teacher dormitories helped solve teacher shortages, and student dormitories helped more children, especially girls, continue their education.

3-2 Discussion

Based on these results, it can be said that not all measures to reduce educational inequality are equally effective.

While digital learning devices can be useful in developed countries, they are not realistic in many developing countries unless internet access, literacy, and IT education improve. Without these conditions, the effect of digital learning is limited.

Building toilets has a positive effect on education, especially for girls, but it cannot be done without proper infrastructure. This means that toilet construction alone is not enough and must be combined with other forms of support.

On the other hand, paying tuition after graduation and building dormitories are more practical solutions. Paying tuition later reduces the financial burden on families and helps break the cycle of poverty and low education. Dormitories improve access to schools, reduce teacher shortages, and create safer environments for students.

Therefore, these two measures are considered more effective and realistic ways to reduce educational inequality in developing countries.

4. Conclusion and Future Prospects

As a final proposal, tuition should be paid after graduation, and dormitories for teachers and students should be built. This would allow children from poor families to receive education and create equal opportunities. Teacher dormitories can also help solve teacher shortages. While the effects of student dormitories need more research, they may improve access to education for girls.

In the future, it is important to think about how to cover costs before students graduate and to consider the risks of building dormitories. We should also actively take part in donations, volunteering, and sharing information. Even small actions can help more children receive education and move toward a more equal world.

5. References

Resolving Water Pollution Caused by Mining Development

Water Purification with Protonema of Funaria Hygrometrica

群馬県立中央中等教育学校

ID 5328 氏名 深井悠加

Abstract

At present, though many developing countries are developing mines, the contaminated water which was discharged from mines has caused serious environmental problems. Many regions lack adequate water purification equipment, so I thought about solving that using a water purification method with Funaria Hygrometrica. I read papers about moss's ability to purify water, investigated the feasibility of moss's purification, and created an ideal mine for developing countries. The calculation shows that the purification using Funaria Hygrometrica is feasible, and it has some advantages such as not requiring energy and being environmentally friendly. There are some obstacles related to finances, social structure, and climate, but it is possible to introduce the system to developing countries and some regions like South Africa.

1. Introduction (Background, Significance, and Purpose)

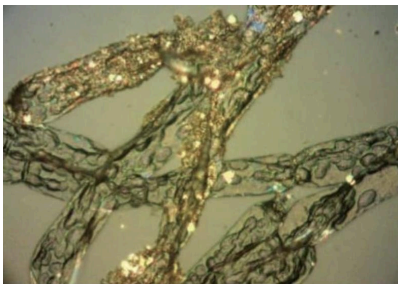
These days, water pollution from mining development has caused serious environmental problems especially in developing countries. Contaminated water used in producing mine, which contains Hg, Zn, Pb, Cu and other toxic chemicals flows into the surrounding areas and causes acute environmental problems. In order to improve the situation, I have focused on moss. The protomena of Funaria Hygrometrica can absorb Pb, Au, Pt and other meals into a very high rate of their body. Furthermore, moss is sustainable and has a lot of merits in terms of environment. I demonstrated the feasibility of using moss for water purification in terms of the amount of metal removed. Then I created an ideal mining system for developing countries by optimizing it from various perspectives. Through introducing the protonema of moss and optimizing the system to developing countries, I want to make people's lives more sustainable.

1-1. Social Context (Current Situation and Problems)

Mining operations are underway in some developing countries. However, because water purification equipment is often not enough, contaminated water which was discharged during developing minings is released to some rivers and other waterways without sufficient treatment. This water contains cadmium, arsenic, lead, and zinc, which cause serious environmental problems such as water contamination. There have also been numerous accidents involving tailings dam collapse which have caused human casualties. Recently, to mitigate heavy metal toxicity and to recover heavy metals for recycling, biomaterials used in phytoremediation and bio-sorbent filtration have recently drawn renewed attention.

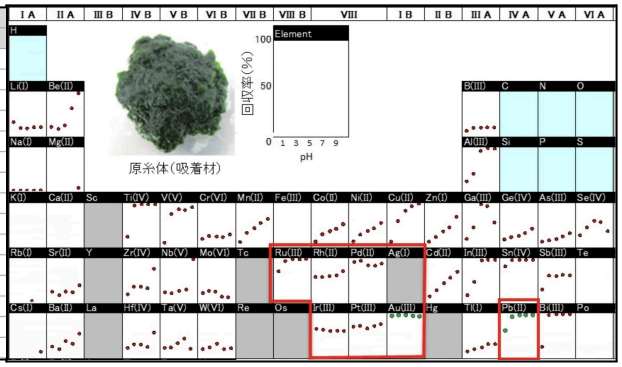
1-2. Previous Research

Protonema of the moss Funaria hygrometrica can function as a lead adsorbent



The research team led by Misao Itoga at RIKEN Institution have revealed that the filamentous protomemal cells of the moss Funaria hygrometrica can absorb lead up to 74% of their dry weight when exposed to solutions containing divalent Pb. Energy-dispersive X-ray spectroscopy revealed that Pb is located on the call walls. The absorption abilities were retained throughout a wide range of pH values, and bound Pb was not desorbed. According to Mr Itoga, Funaria hygrometrica and the absorbed metals can be separated and reused, and the protonema of Funaria hygrometrica can be increased by up to 300 times in two weeks.

Element name	Symbol	Maximum adsorption capacity[a]
		[%]
Lithium	Li	0.0
Aluminum	Al	0.9
Chromium	Cr	6.5
Manganese	Mn	1.3
Cobalt	Co	2.5
Nickel	Ni	0.9
Zinc	Zn	0.5
Selenium	Se	0.1
Yttrium	Y	0.2
Molybdenum	Mo	1.2
Silver	Ag	0.7
Platinum	Pt	4.2
Gold	Au	11.3
Thallium	Tl	5.5
Lead	Pb	74.1



1-3. Research Question (RQ)

How can the “Moss Purification System” be optimized for developing countries?

Through this research, water contamination problems from mine development in developing countries will be solved by using moss’s ability to purify water. I want to optimize the moss’s purification system and suggest an ideal mine system for developing countries.

1-4. Hypothesis

I think that purification using moss is quantitatively feasible because moss can be used again and again. However, it will be difficult to overcome various issues related to finances, social structure, and climate. Therefore, we should introduce the system to counties which are adequate in governmental support or investment from developed countries.

2. Research Method

❶ research some paper about moss's metal absorption ability and the current situation in developing countries

❷ calculate the amount of metal absorption in detail

❸ make an ideal mine system for developing countries

❹ investigate the impact of introducing the system

❺ optimize the system for developing countries paying attention to the feasibility

3. Results and Discussion

3-1 Results

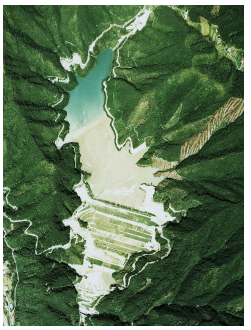
【The Problem Related to Mining Development】

Mining development is necessary for our lives and the demand of metal including rare earth metals is increasing according to the improvements of digital technologies. However, there are many problems in metal mining.

① some aminals and humans lose their habitat

The forest area is decreasing due to mining development, and many animals and other creatures are suffering from that. For Instance, In the Democratic Republic of the Congo, the mining of the rare metal tantalum has caused endangered gorillas to decline in number.

② Mining Waste cause serious environmental pollution



Large amounts of mining waste are generated during mining development. Though in general, they are removed in tailing dams, collapse by damage of the dam due to flood and aging can lead to environment pollution with water and soil which contain toxic materials running into surroundings. It is necessary to improve the equipment of tailing dams.

③ Mining Development Consume Much Amount of Water and Energy

Extracting metals from mined ores requires large amounts of water and energy. For instance, we need as much as 110 tons of water for cooling and washing in order to produce one ton of iron and some furnaces used to melt iron consume the equivalent of 100 years' amount of electricity for a household in a single day.

④ Labor Issue

It is often the case that labor is carried out under poor conditions, what is more, in places where primitive mining is conducted, problems such as child labor or forced labor often occur. This kind of mining development is involved in significant vested interests and large-scale capital. Also, in countries under unstable political situations, corruption tends to be generated and it is suspected of being the source of funding for armed groups.

【Present Circumstances in Developing Countries】

Accidents Involving Mining Development (from New York Times)

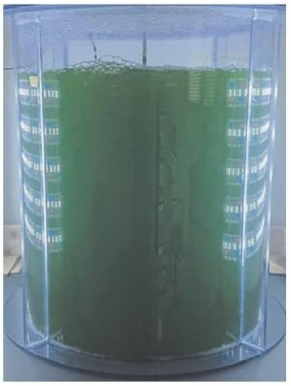
”Waste From Mine in Angola Kills 12 Downstream in Congo, Minister Says”

In July, toxic waste containing heavy metals from Angola’s largest diamond mine spilled into the Kasai River, leading to severe water pollution that disrupted fishing, caused waterborne illnesses, and limited access to clean water for thousands of people in the Democratic Republic of Congo. However, Catoca, the company that operates the mine, denies responsibility, so Angola’s government is trying to determine the true source of the pollution. It is crucial to dilute the contaminated water before it reaches the capital.

“Dozens Feared Dead in Collapse of Informal Gold Mine in Mali”

Dozens of people have died in Mali after an artisanal gold mine collapsed, but it is not immediately clear what caused the collapse or exactly how many people were killed. Artisanal mining has become popular in several West African countries over the past two decades. It has provided a livelihood for many people but has also fed trafficking routes and attracted armed groups. Much of the gold — which has been an important part of Mali’s economy — comes from artisanal mining, and it is often smuggled to the United Arab Emirates. In order to gain more control over the profits from mining, Mali’s government adopted a new mining code that gives the state and local investors a larger stake in mining projects. Mali has also strengthened its relationship with Russia, which has sent weapons and mercenaries to help crush insurgents and rebel groups.

【Actual Effectiveness of Funaria hygrometrica】



Question

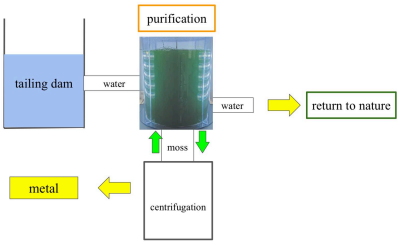
If we use moss purification at a real mining site, how long will it take for the moss to absorb Pb?

I check whether it is achievable in terms of time and amount.

Methods (Simple Explanation)

- We use water from a tailings dam, where polluted wastewater is stored.

- The purification is conducted in 4-day cycles:
  - Days 1–2: The moss absorbs the lead in the water.
  - Days 3–4: We use a centrifuge to separate the moss from the metals.
    (Based on Itoga's study, it takes about two days for Funaria hygrometrica to absorb as much lead as it can.)
- After the moss purificate the water, the water is returned to nature.
- The used moss is put into a centrifuge to remove the metals.
- The moss which no longer has toxic metals is put back into the tank and used again.
- This cycle is repeated.



Conditions

1. After the moss absorbs lead, 70% of its total mass becomes lead.
2. The initial amount of moss used is 10 L (not dry weight).
3. 500 g of moss (wet weight) has a dry weight of 7 g.
4. The time required for centrifugation is ignored because separation is easy.
5. The amount of wastewater produced per day is 100,000 L.
6. The goal is to reduce the lead concentration from 1.9 mg/L to 0.0 mg/L.
7. The dam is assumed to have a volume of 10^8 m^3, and 40% of it is filled with water.
8. The moss increases 300 times in two weeks.
9. The moss is assumed to grow on all four days of each cycle, and any effect of metal absorption on cell division is ignored.
10. Significant figures are not considered, and convenient numbers may be used to simplify calculations.

Calculation

From ②③:

The dry weight of the moss at the initial stage is $7 \times 20 = 140$ g.

Also, from ①, if the amount absorbed is a,

$(140 + a) \times 0.7 = a \Leftrightarrow a \fallingdotseq 326$ g

From ⑧:

$b^{14} = 200 \Leftrightarrow b \fallingdotseq 1.5$

Therefore, in 4 days, it increases by approximately $1.5^4 \fallingdotseq 5$ times.

Let n be the number of 4-day cycles.

From the above, the amount of lead absorbed by the moss forms a geometric sequence with the first

term 326 and common ratio 5.

Thus, its sum is $326(5^n - 1) / 4$.

From ⑦, the volume of water in the dam is

$10^8 \times 0.4 = 4.0 \times 10^7$ L.

The initial amount of lead contained in the dam is

$4.0 \times 10^7 \times 1.9 \div 10^3 = 76{,}000$ g

Also, from ①, the amount of lead contained in the wastewater generated over 4 days is

$4 \times 10^4 \times 1.9 \div 10^3 = 760$ g.

Therefore, the total amount of lead forms an arithmetic sequence with the first term 76,000 and common difference 760.

The condition for the total amount of lead originally in the dam plus the newly released lead to exceed the amount of lead absorbed by the *Funaria hygrometrica* moss is:

$326(5^n - 1) / 4 > 76{,}000 + 760n$

$\Leftrightarrow 5^n - 9.33n > 933$

$\Leftrightarrow n \fallingdotseq 4.28$

Therefore, the number of days required for *Funaria hygrometrica* to absorb more lead than the amount contained in the wastewater is

$4.28 \times 4 = 17.12$ days .

3-2 Discussion

【From the Calculation】

It was revealed that it is possible to introduce moss as a material for water purification in real situations, considering that moss can be recycled and multiplied 300 times in two weeks. However, some social problems related to finance, social structure and climate still remain to be solved.

【Comparison between the general purification system and the method with moss's ability】

<u>General System</u>

・use toxic chemicals for neutralization

・consume large amounts of electricity ・stable

<u>Moss's purification System</u>

・eco-friendly thanks to natural material

・utilizes sunlight and exhaust gases in order to grow Funaria Hygrometrica, resulting in low electricity consumption and contributing to stopping global warming

・don't need complex equipment ・be conditioned by climate

【Resolving Water Pollution Caused by Mining development】

5328 Fukai-8

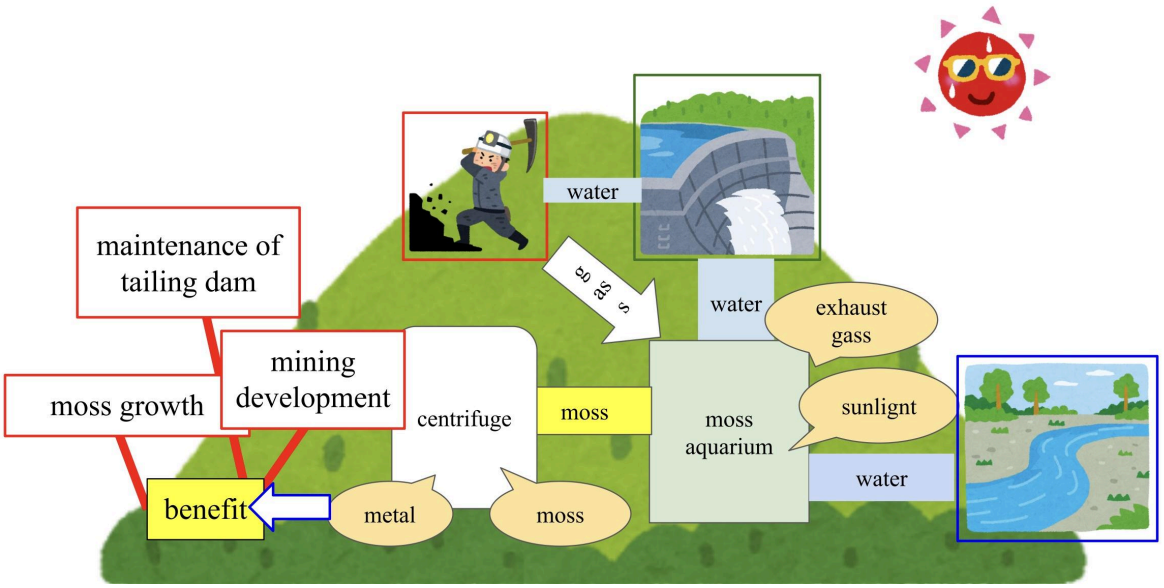
【What I Learned from Foreign Papers】

・While mining development supports the livelihoods of many people, it is also linked to human trafficking and armed groups.

・Through mining development, various accidents have occurred involving both people and the natural environment.

・If we consider actual implementation, it will be necessary to study the current state of mining development and society in more detail.

【Ideal Mine System of Moss Purification for Developing Countries】



・use tailing dan's water for purification

・utilize exhaust gasses from miming and sunlight to purification water

・return cleared water to nature and send contaminated water to centrifuge

・used the separated water many times and utilize the metal generated from centrifuge to create benefits

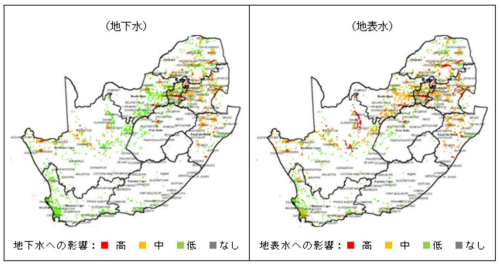
・make use of the benefit for moss growth, maintenance of tailing dam and mining development

【Example of Countries Implementing】

I am focusing on South Africa among African countries from some perspective.

<u>Problem in South Africa</u>

In South Africa, it is a serious problem that the acid water containing heavy metals drained from mine pollutes rivers and groundwater around it. South Africa has some contaminated regions, especially Witwatersrand, Witbank, Elmero.



【Resolving Water Pollution Caused by Mining development】

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South Africa's Mining development

Major mineral resources and global rankings:

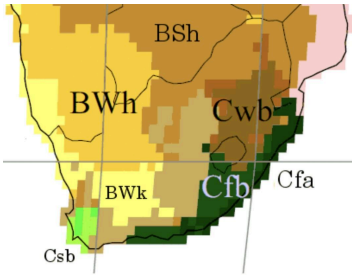
- Platinum: 1st in the world in production
- Manganese: 1st in the world in production
- Chromium: 1st in the world in production
- Rhodium: 1st in the world in production
- Palladium: 2nd in the world in production
- Vanadium: 3rd in the world in production
- Ilmenite : 2nd in the world in production

Other major minerals:

- Coal: One of the main export commodities and the second-largest source of revenue
- Iron ore: A major export product
- Gold: One of the important export commodities
- Diamonds: A major export product

South Africa is one of the countries with the most active mining development and rich in a wide range of mineral resources which support the South African economy.

South Africa's Situation



South Africa is relatively politically and economically stable. Also, aid from the country's government or from developed nations is substantial and many mines have well-developed infrastructures. In addition, the climate is suitable for moss's growth because the main region of mining development is classified as temperate zone.

Then, I focused on Witwatersland, one of the world-class gold deposit regions. It is said that an estimated 30–40% of the world's historically mined gold comes from this area.

Characteristics of Witwatersland

1. An Unprecedented "Ultra-Deep" Gold Mining Region

The mine is too deep, so that leads to environmental, safety and cost problems. In addition, developing the mine requires a large amount of electricity and water.

2. Geological Coexistence of Gold and Uranium

Gold-bearing rocks in the Witwatersrand often contain uranium although it is usually rare. Therefore, as a result, soil, water, and even agricultural products can be contaminated for a very long time.

3. Mines Beneath a Major City

Johannesburg has developed directly on top of former mining areas, so the city has serious infrastructure problems such as water pollution and land subsidence.

4. An Abnormally Large Number and Density of Tailings Dams

In Witwatersland, there are from several hundred to nearly 1,000 tailings dams. They are causing acute environmental problems spreading dust, heavy metals, and uranium

5. “Unstoppable” Problem

Many closed mines have been left abandoned and the responsibility for future costs remains unclear.

6. Overlap of Environmental Problems and Social Inequality

Low-income communities are located near contaminated areas, so there is a possibility that some mines are controlled by armed groups, which raises concerns about public safety.
Also, frequent illegal mining activities have taken place.

Then, I research how suitable my system is to this region from these perspectives.

feature	yes/no	comment
1. An Unprecedented “Ultra-Deep” Gold Mining Region	○	・don’t use much electricity ・the cost and safety problems are unclear
2. Geological Coexistence of Gold and Uranium	△	・possibility that it may absorb radioactive substances. ・require more research
3. Mines Beneath a Major City	△	・can solve water pollution ・cannot handle with land subsidence
4. An Abnormally Large Number and Density of Tailings Dams	◎	・use water in the tailing dam ・lead to the management of aging dams
5. AMD as an “Unstoppable” Problem	○	・use natural resources (moss / the sunlight / gass) ・sustainable
6. Overlap of Environmental Problems and Social Inequality	×	・cannot cope with the security problems ・lack of environmental consciousness

4. Conclusion and Future Prospects

It was revealed that the purification using Funaria Hygrometrica is feasible in terms of quantities and it had some advantages related to the environment and other aspects. It doesn’t require complex equipment, so if it becomes dilapidated, it is possible to deal with it using local technology.

Some obstacles related to finances, social structure, and climate, remain to be solved, but we will introduce the moss's purification system to countries like South Africa because of substantial aid from its government and many developed countries.

The social structure of not being concerned about environmental problems and just seeking their benefits is a very large obstacle to introducing the system. Therefore, it is necessary for us to make a society which is environmentally conscious.

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「『南アフリカ共和国の鉱業で今、起こっていること』-南アフリカ共和国の鉱業の諸問題について-」

Safety for babies and pregnant women around the world

～What is a safe medical system?～

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Abstract （研究の概要）

Every year, more than 280,000 pregnant women die and 5 million children die before the age of five, mostly in developing countries. Many of these deaths could be prevented with basic medical care. Problems include lack of education, home births with heavy bleeding, and poor

sanitation.
To improve this situation, I propose creating “Women’s Schools,” which support women before, during, and after childbirth. By building these schools in developing countries, we can reduce maternal and infant deaths. Funding could come from crowdfunding and international trade agreements, but reducing the financial burden on developing countries while keeping the system fair for developed nations is still a challenge.

1. Introduction (Background, Significance, and Purpose)
Currently, over 280,000 pregnant women die each year worldwide, and 5 million babies die before reaching their fifth birthday. Most of these occur in developing countries, and the vast majority could be prevented with even minimal medical infrastructure. Causes include lack of education leading to home births resulting in death from excessive bleeding, poor sanitation causing illness, and various other reasons. I want to improve this situation. I also want to be a doctor in the future, so I think learning about global medical problems will be useful for me.

1-1. Social Context (Current Situation and Problems)
Currently, over 280,000 pregnant women die each year worldwide, and 5 million babies die before reaching their fifth birthday. Most of these occur in developing countries, and the vast majority could be prevented with even minimal medical infrastructure. Causes include lack of education leading to home births resulting in death from excessive bleeding, poor sanitation causing illness, and various other reasons.

1-2. Previous Research
① Case Study: Palestine

The Japanese government, together with the United Nations Population Fund (UNFPA), has supported efforts to improve maternal health in Palestine. In the Gaza Strip, maternal deaths caused by complications have long been a serious problem. To address this issue, UNFPA and the Japanese government carried out several measures, including:

Developing a system to record life-threatening cases involving pregnant women.

Creating guidelines and procedures for venous thromboembolism, which pregnant women are likely to develop, and providing training for healthcare workers.

Supplying and distributing Bakri balloons to prevent postpartum bleeding.

Although maternal deaths in Palestine increased by about 43% in 2020 compared to 2019, deaths caused by bleeding have decreased since 2021.

② Case Study: Nepal

In Nepal, about 35% of the country is covered by mountain ranges, and its steep terrain makes

transportation difficult. As a result, many pregnant women have limited access to hospitals and health centers, cannot receive regular checkups, or give birth without doctors present. In 1990, Nepal had one of the highest maternal mortality rates in the world. However, the situation improved through the following measures:

Increasing the number of health centers and health posts that provide basic medical services

Legalizing abortion

Making childbirth free of charge

Improving transportation networks

As a result, the number of maternal deaths decreased from over 750 per 100,000 births in 1990 to 250 in 2015.

1-3. Research Question (RQ)

What is the safe medical system in developing countries?

Currently, about 800 pregnant women die every day. Although this number has decreased compared to the past, it still remains very high. Most of these deaths occur in developing countries in Africa, and the fact that they could be prevented with even simple medical systems shows that proper healthcare has not yet reached many parts of the world.

表② 世界および地域別の基本統計と保健・医療指標②

	人間開発指数（HDI）	平均寿命（歳）			乳児死亡率（/1,000出生）			妊産婦死亡率（/100,000出産）	
	2018	1970	2000	2018	1960	1990	2018	1990	2017
世界全体	0.71	59.2	67.6	72.6	108.6	53.0	21.4	197.0	137.7
日本	0.92	72.4	81.2	84.5	31.0	5.0	2.0	8.0	5.0
先進国	0.89	69.3	77.9	81.9	56.5	10.8	3.3	10.0	5.1
後発開発途上国	0.52	43.1	55.5	65.0	172.0	106.7	42.9	474.6	381.5
サブサハラアフリカ	0.52	44.1	50.5	61.3	150.9	104.9	46.1	521.4	448.3
南アジア	0.63	48.4	62.7	69.4	146.9	91.0	32.7	512.3	156.2
東南アジア	0.70	60.6	70.9	72.4	123.2	51.5	19.8	233.4	130.4
NIS 諸国	0.70	67.8	65.8	72.2	48.1	27.0	10.0	40.9	19.0
中東，北アフリカ	0.73	51.7	69.1	74.6	160.7	49.7	15.5	136.0	46.0
中南米，カリブ海	0.75	60.3	71.6	75.4	99.5	42.3	13.4	206.3	68.9
オセアニア	0.93	67.0	74.7	78.3	40.6	19.2	11.7	216.3	39.1
東アジア	0.78	60.6	72.3	77.4	133.0	37.6	6.6	23.0	27.5
西欧	0.90	71.3	77.7	81.6	36.9	8.7	3.3	8.2	5.5
北米	0.92	70.9	77.0	79.2	26.2	8.8	5.8	8.0	18.1

（世界子供白書2019，UNDP Human Development Report 2019，World Bank Open Data 2019より作成）

1-4. Hypothesis
Wouldn't building schools for women directly or indirectly prevent the deaths of pregnant women and their babies?

One piece of prior research that led me to this idea is UNICEF's global campaign "Every Child ALIVE," which calls for solutions and actions on behalf of newborns around the world. Through this campaign, UNICEF urges governments, healthcare workers, donors, the private sector, families, and communities to take the following steps to protect the lives of all mothers and children:

1. Invest in health systems starting from the community level.
2. Employ, train, support, and manage a sufficient number of doctors, nurses, and midwives specializing in perinatal and newborn care.
3. Ensure clean, functional health facilities with water, soap, and electricity that all mothers and babies can access.
4. Prioritize the supply of essential medicines and equipment needed to safeguard mothers and babies and to help newborns start healthy lives.
5. Empower teenage girls and their families so they can demand and receive high-quality care.

2. Research Method
① Search for previous studies and research results on websites such as UNICEF, and think of initiatives that can solve the problems found.
② Add new proposals to address any issues that arise from these new initiatives and make the plan more concrete.
Repeat steps ① and ②.

3. Results and Discussion

3-1 Results（結果）

The "Women's School" that I propose consists of the following three elements, from ① to ③.

① **Education**

Previous research

When Shionogi Pharmaceutical conducted basic education in Kenya, such as teaching proper handwashing methods, the rate of facility-based deliveries increased from 4% to 47%. This suggests that a lack of knowledge can lead to home births and deaths caused by severe

bleeding, and that education can help prevent such deaths. Here, education does not mean academic learning, but practical knowledge, including hygiene management, childbirth, and childcare after birth.

② **Distribution of Medical Tools**

A. iCTG (Delivery Monitoring Device)

iCTG is a fetal monitoring device combined with a perinatal telemedicine platform called "Melody i." Even in areas without nearby medical facilities, it allows healthcare providers to monitor the health of mothers and babies remotely and support safe childbirth. Regular screening helps predict and avoid high-risk emergency deliveries, and it also reduces the workload and legal risks faced by obstetric facilities and doctors.

Previous research

Melody International Inc. conducted an ICT-based remote medical support project for maternal care and diabetes management in Thailand.

B. Bakri Balloon

The Bakri balloon is a medical device used to stop bleeding after childbirth.

Previous research

In Palestine, after the Bakri balloon was distributed to pregnant women, maternal deaths increased by about 43% in 2020 compared to 2019. However, deaths caused by bleeding have decreased since 2021.

③ **Medical Care**

By gathering doctors and nurses in one medical facility, it may be possible to provide higher-quality medical care.

3-2 Discussion（考察）

If "Women's Schools" are to be established in practice, a large amount of funding and human resources will be required.

Previous research

In rural areas of Cambodia, some births are still attended by traditional birth attendants who have not received medical training. As a result, the infant mortality rate (the number of deaths of children under one year old per 1,000 births) remains high and has not improved. While the infant mortality rate in urban areas is 13, it is 42 in rural areas, which is nearly three times

higher.

To make childbirth safer for both mothers and babies, a hospital was built with the aim of providing a safe place for delivery and teaching medical skills that help prevent infant deaths, without requiring visits to expensive private hospitals or risking dangerous home births.

Most of the funding for this hospital came from donations by ordinary citizens. Although this method is not sufficient for building many hospitals, the total cost of about 15 million yen can be used as a reference.

Based on this example, I propose using crowdfunding and covering the remaining costs through international trade. For example, Japan imports coffee beans from Ethiopia and ranks as the fourth-largest importing country. In exchange for providing medical equipment and personnel, Japan could negotiate lower prices for coffee beans. In this way, I believe it is possible to create a more balanced and sustainable economic system.

4. Conclusion and Future Prospects

Today, many pregnant women and babies around the world, especially in developing countries, die because they do not receive adequate medical care. To address this problem, I propose establishing “Women’s Schools” in developing countries, where medical equipment can be provided and women can receive education and medical checkups. I believe that creating these Women’s Schools will help reduce preventable deaths in these regions.
To operate the schools in the long term, it may be possible to create a financial and human-resource cycle through crowdfunding and economic partnerships in trade. However, developing countries would still face financial burdens, so finding a better system for supporting these costs remains an important challenge for the future.

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妊産婦の死亡率が高いアフリカではどんな対策が必要？行われている支援とは

Are there effective public health strategies for preventing Seasonal Affective Disorder (SAD)

~Through public institution~

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Abstract

1. Introduction (Background, Significance, and Purpose)

Many people living in high-latitude regions in the Northern Hemisphere, such as Northern Europe, suffer from wintertime lethargy caused by weather conditions. These symptoms are known as winter depression or Seasonal Affective Disorder (SAD), a mental condition influenced by seasonal changes. According to one study, between 1% and more than 10% of the population in Europe and the United States are affected by this disorder. In order to reduce the number of people suffering from SAD, my first-year research focused on examining whether measures aimed at the general public can be effective. The ultimate goal of my study is to consider strategies that take into account the high possibility that a large portion of the population may develop this condition.

1-1. Social Context (Current Situation and Problems)

In modern society the idea that mental health is as important as physical health has become more widely recognized, and companies and schools have begun to introduce measures to manage stress. However, disorders influenced by climate, such as Seasonal Affective Disorder (SAD), are still not well understood. SAD can lead to increased anxiety and a decrease in motivation and concentration, which can seriously interfere with people's daily lives.

1-2. Previous Research

According to Rosenthal et al., Seasonal Affective Disorder (SAD) can be defined when the following four criteria are met:

A) The individual meets the Research Diagnostic Criteria (RDC) for major affective disorders.

B) The individual experiences depressive episodes that appear during the fall and winter and remit in the following spring and summer for at least two consecutive years.

C) The individual does not have any psychiatric disorders listed under Axis I of the DSM-III-R.

D) The condition cannot be explained by clear psychological or social factors.

According to Johns Hopkins Medicine, one major factor contributing to SAD is the reduced number of daylight hours in winter. In other words, in regions such as Europe—especially countries like Finland, where polar nights occur and the sun may not rise for an entire day during winter—SAD symptoms are more likely to appear.

It has also been reported that SAD is more common among individuals with the S-allele of the serotonin transporter gene and among women. This condition is often accompanied by symptoms such as overeating and weight gain. It is suggested that women may be more

susceptible to such symptoms, because their physical condition is more easily influenced by hormonal fluctuations. The serotonin transporter normally terminates serotonin neurotransmission by reabsorbing serotonin, but individuals with the short (S) variant have reduced transporter efficiency, making them more prone to chronic serotonin deficiency and increased feelings of anxiety.

1-3. Research Question (RQ)

What measures can be taken to address weather-related mental disorders for the general public, and are there any existing interventions that can be applied to such conditions?

1-4. Hypothesis

Providing public bright-light spaces in winter may help prevent or lessen seasonal declines in mood among the general public.

2. Research Method

This study adopts a literature-based research method to examine whether public bright-light spaces (light lounges) can be an effective public health measure for weather-related mental disorders, particularly Seasonal Affective Disorder (SAD).

Academic journal articles, public health reports, and review papers published by international health organizations were collected and analyzed. The literature focused on examples of environmental or community-level interventions aimed at improving mental well-being.

By comparing findings across these sources, this study evaluates the feasibility and potential effectiveness of light lounges as a population-level preventive strategy. No original experiments or surveys were conducted.

3. Results and Discussion

3-1 Results

In Scotland, a winter mental health initiative implemented through public libraries provides a clear example of a successful community-level intervention. The project made light therapy lamps and mental well-being resources available in non-medical, easily accessible public spaces, allowing individuals to engage with mental health support without the need for formal diagnosis or clinical visits. As a result, participants reported improvements in mood and overall well-being during the winter months.

Importantly, the use of libraries—spaces already familiar and trusted within the community—helped reduce psychological barriers and stigma often associated with seeking mental health care. In addition to its preventive effects, the initiative increased public awareness of seasonal mental health issues, including Seasonal Affective Disorder (SAD), by embedding information and support into everyday environments. This case demonstrates that open, community-based interventions can effectively complement traditional medical

approaches by simultaneously addressing prevention, accessibility, and awareness.

Based on this compelling evidence, I propose the implementation of light lounges as a community-level public health intervention. The details are as follows:

1.Definition

- ❖ A light lounge is a publicly accessible bright-light space designed to compensate for reduced daylight hours during winter.
- ❖ It functions as a preventive environmental intervention rather than a medical treatment.

2.Purpose

- To reduce seasonal mood deterioration and support mental well-being.
- To provide an open and low threshold form of mental health support.
- To increase public awareness of Seasonal Affective Disorder and related conditions.

3.Designed Features

- To prevent excessive sensory stimulation the space is designed to allow light to enter indirectly.
- Whenever possible, the design should incorporate natural daylight, such as through large windows with sheer curtains or blinds, frosted glass walls or architectural overhang.(Natural light is prioritized, as it more closely reflects real daylight and supports circadian rhythms.
- Artificial lighting is used to supplement natural light, especially on cloudy days or during shorter winter daylight hours.
- The space maintains an open, comfortable, and non-clinical atmosphere using light colors and natural elements.

4.Usage

- Open to everyone without diagnosis or reservation
- Can be used for studying, reading, resting, or social interaction.
- Especially recommended during morning to early afternoon hours.

5.Location

- Schools, public libraries, community centers, and other public facilities
- Existing public spaces to reduce cost and improve accessibility.

3-2 Discussion

The results support the hypothesis that public bright-light spaces can function as a preventive

public health measure rather than a clinical treatment. Unlike individual light therapy, light lounges lower psychological and social barriers by offering an open, non-stigmatizing environment that anyone can use. Furthermore light lounges may help prevent SAD while also raising public awareness of seasonal mood disorders, which is hard to accomplish through conventional medical approaches.

From a public health perspective, this approach is advantageous because it does not require diagnosis, specialized staff, or intensive medical resources. Instead, it focuses on modifying the environment to reduce risk factors associated with seasonal mental disorders. This makes light lounges particularly suitable for schools and community facilities.

However, the literature also suggests limitations. Light lounges are unlikely to be sufficient for individuals with severe depression or clinically diagnosed SAD, who may require professional treatment. In addition, proper guidelines—such as recommended usage times—would be necessary to avoid disrupting sleep patterns.

4. Conclusion and Future Prospects

This study examined the potential of light lounges as a community-level public health intervention for addressing seasonal mood deterioration. By integrating natural daylight with carefully designed artificial lighting, light lounges offer an accessible and non-clinical approach to supporting mental well-being during winter months.

The proposed design emphasizes indirect light exposure, openness, and comfort, which may reduce excessive sensory stimulation while supporting circadian rhythm regulation. In addition to their preventive effects, light lounges can contribute to increasing public awareness of Seasonal Affective Disorder (SAD) by embedding mental health support into everyday public spaces.

Future research should evaluate the long-term effectiveness of light lounges through observational studies and user feedback. Further exploration is also needed to determine optimal design conditions, usage duration, and integration with existing public health and educational facilities. With appropriate implementation, light lounges have the potential to become a scalable and cost-effective complement to existing mental health interventions.

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季節性の感情障害と秋
By 心クリニック日本橋
2023 October 15

【What human-driven actions can be taken immediately to stop coral bleaching?】

What human-driven actions can be taken immediately to stop coral bleaching?

Stopping Coral Bleaching

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【What human-driven actions can be taken immediately to stop coral bleaching?】

Abstract

In recent years, the rapid decrease of coral in the Asia–Pacific region has become a serious problem. This is because coral reefs play many important roles. The main reason for the decline of coral is coral bleaching. Coral bleaching is a phenomenon in which coral appears white because the polyps lose their color due to stress or changes in the environment.

Coral has a complex symbiotic relationship with certain algae. These algae perform photosynthesis and provide nutrients to the coral. However, when stress or environmental changes break this relationship, coral may become bleached. Bleaching is caused by both natural and human factors, but this time I focused on human factors.

Human factors include marine pollution caused by harmful substances and overfishing. Since there was little data about fishing, I researched marine pollution. I found that untreated wastewater is the main cause, especially in the Asia–Pacific region. Developing countries need to improve their sewage systems and wastewater facilities.

Therefore, I propose installing simple water treatment tanks in each household. In Japan, foldable and easy-to-use treatment tanks have already been developed and are actually used. By providing these devices from Japan, I believe that coral reefs in Japan can be protected.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

In recent years, the rapid decrease of coral in the Asia–Pacific region has become a serious issue. Although it is not widely known, coral reefs have many important roles. First, coral reefs cover only 0.1% of the Earth's surface, yet about 90,000 species live there, which shows how rich their biodiversity is. Second, coral reefs serve as tourism resources. Some countries are even formed by coral reefs, and they attract many tourists. Third, coral reefs help produce oxygen in the ocean. The decline of coral is believed to be caused not only by human activities such as coastal development, overfishing, dynamite fishing, and marine pollution, but also by natural factors like hurricanes, crown-of-thorns starfish, and high ocean temperatures. In response to this situation, measures such as establishing marine protected areas, preventing sediment run off, and promoting coral restoration are being considered.

1-2. Previous Research

According to Reefs at Risk, a report published by the World Resources Institute in 1998, 58% of the world's coral reefs were already at risk. The causes included human activities such as coastal development, dynamite fishing, overfishing, marine pollution, and soil erosion caused by deforestation and farmland development. In addition to these, natural factors such as hurricane damage, high seawater temperatures that lead to bleaching, and outbreaks of crown-of-thorns starfish also contributed to coral death. In the revised version of the report published in 2011, it was reported that 75% of the world's coral reefs were in a dangerous condition.

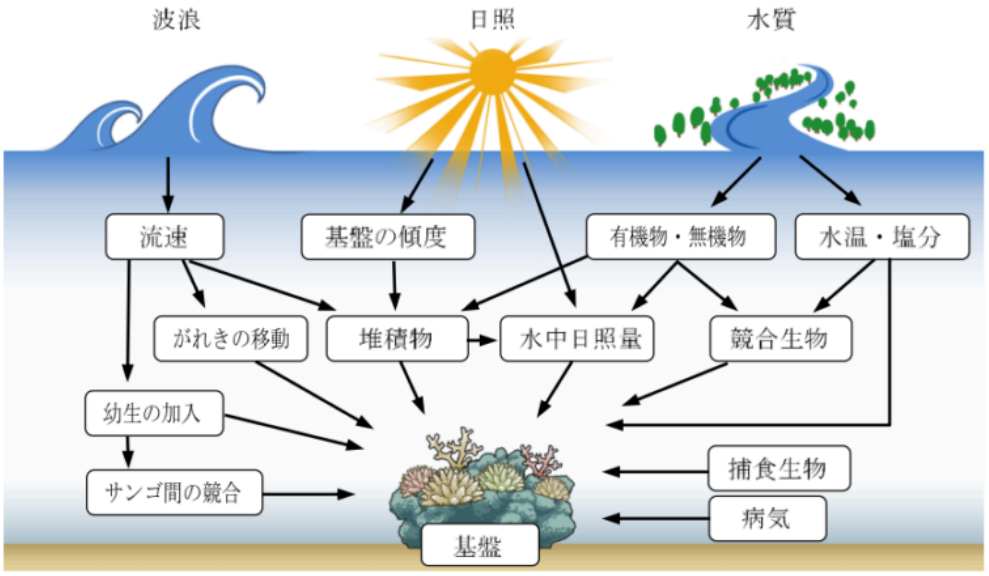
The decrease of coral reefs is closely related to coral bleaching. I therefore researched the causes of coral bleaching. There are two main causes.

【What human-driven actions can be taken immediately to stop coral bleaching?】

The first cause is rising seawater temperature (Figure 1). This is considered the main reason for coral bleaching in recent years. Due to global warming, seawater temperatures have been rising over the long term, and this has had a serious impact on coral reefs around the world. According to data from the Japan Meteorological Agency, seawater temperatures around Japan have risen by about 0.9°C over the past 100 years. Coral can live best at 25–28°C, and bleaching is more likely to occur when temperatures stay above 30°C for a long period. Short-term climate changes such as the El Niño phenomenon can also cause rapid rises in seawater temperature and promote bleaching.

The second cause is environmental stress. Coral bleaching can be triggered not only by high water temperature but also by various environmental stress factors. Major examples include:

1. Excessive sunlight
2. Fresh water inflow
3. Red soil and sediment inflow
4. Water pollution
5. Eutrophication
6. Overtourism
7. Over fishing
8. Movement of rubble



1-3. Research Question (RQ)

What can we do right now to stop coral bleaching?

To stop coral bleaching, we can think of two major approaches:

(1)Improving environmental problems such as rising seawater temperatures

(2)Eliminating human-caused factors such as sediment run off.

However, effective solutions to global environmental problems are still being explored by

countries around the world. Therefore, I decided to focus my research on eliminating human-caused factors.

1-4. Hypothesis

I thought that one of the human factors causing coral bleaching is marine pollution produced by developing countries in the Asia–Pacific region. It is already known that coral loss in the Pacific Ocean is very serious, and many developing countries are located in this region. In many of these countries, water and sewage systems are not well developed, so factory wastewater and household wastewater may be flowing directly into the ocean.

2. Research Method

First, I will research the human factors that cause coral bleaching. Then, I will examine the water and sewage system coverage in developing countries and identify which human factor needs to be addressed the most.

3. Results and Discussion

There are two major human factors that accelerate coral bleaching. One is water pollution, and the other is overfishing. I first planned to study both, but because there was not enough data about fishing, my research focused only on water pollution.

In many developing countries in Asia, water pollution is a serious problem. The main causes are industrial wastewater, chemical fertilizers and pesticides from agriculture, and the lack of proper urban sewage systems. These problems worsen the water quality of rivers, lakes, and coastal areas, increasing health risks. I thought that this polluted water might flow into the ocean.

So first, I investigated what kinds of polluted water are flowing into the sea within Japanese territory. There are various causes of marine pollution, but according to the Japan Coast Guard, the most common cause they have identified is oil spills. This is followed by waste materials and harmful liquid substances, such as cargo tank washing water (Figure 2). The Japan Coast Guard also reports that more than half of the oil spills come from ships, and many of them are caused by carelessness during operations. Next, I investigated the problem of polluted water in Asian countries. Although I could not find specific numerical data, several events show that wastewater from homes and factories is having harmful effects on the environment.

In China, a serious case of marine pollution occurred in 2020, when a large number of fish died. The spill of pollutants had a particularly strong impact on the River Delta region, which is one of China’s main fishing areas. Many local fishermen depend on this area for their livelihoods, and the pollution caused many fish to die, giving a heavy blow to the fishing industry. It was found that this pollution was mainly caused by industrial waste and agricultural chemicals, which made the water quality rapidly worse.

In India, industrial wastewater, pesticides, and household waste flow into the ocean through rivers, causing serious damage to marine ecosystems. Industrial areas such as Goa and

【What human-driven actions can be taken immediately to stop coral bleaching? 】

Maharashtra have especially high emissions of harmful substances, and their toxic effects on marine life have been reported.

Bangladesh is facing similar problems. In industrial areas such as Dhaka and Chittagong, harmful chemicals from factories and pesticides flow into rivers and eventually reach the ocean, negatively affecting marine ecosystems.

From these examples, it is clear that marine pollution is becoming more serious in many developing countries in Asia. A common issue is that water and sewage systems are not well developed, so harmful substances from factories and households are flowing directly into the sea.

Based on this, I considered measures to improve water quality. First, I researched what efforts have already been made. In China, the government revised the "Marine Environmental Protection Law" in 2020 to strengthen regulations on harmful emissions. It is also working on the problem of marine plastic pollution, with plans to greatly increase the country's plastic waste processing capacity by 2025. China is also participating in international cooperation, such as the MARPOL Convention, which aims to prevent marine pollution. In India, many factories are located near the coast and are easily affected by marine pollution. To address this, the government has strengthened regulations on factory wastewater and introduced the "Water Pollution Control Law," supervised by the Ministry of Environment. It is also working with local communities to establish marine protected areas to conserve marine ecosystems. Similarly, Bangladesh is taking steps to reduce harmful emissions from factories. The government has strengthened the management of chemical substances used in factories and enforced the "Environmental Protection Act," supervised by the Ministry of Environment. It is also cooperating with local communities to improve the monitoring and management of marine pollution.

4. Conclusion and Future Prospects

I think that installing simple wastewater treatment tanks would be an effective way to reduce the decline of coral reefs. In Japan, the construction of treatment tanks is common, and the country has well-developed technology. However, there are some challenges when installing these tanks in Southeast Asia. The climate in Southeast Asia is very different from that of Japan. Therefore, I propose installing the treatment tanks inside irrigation channels.

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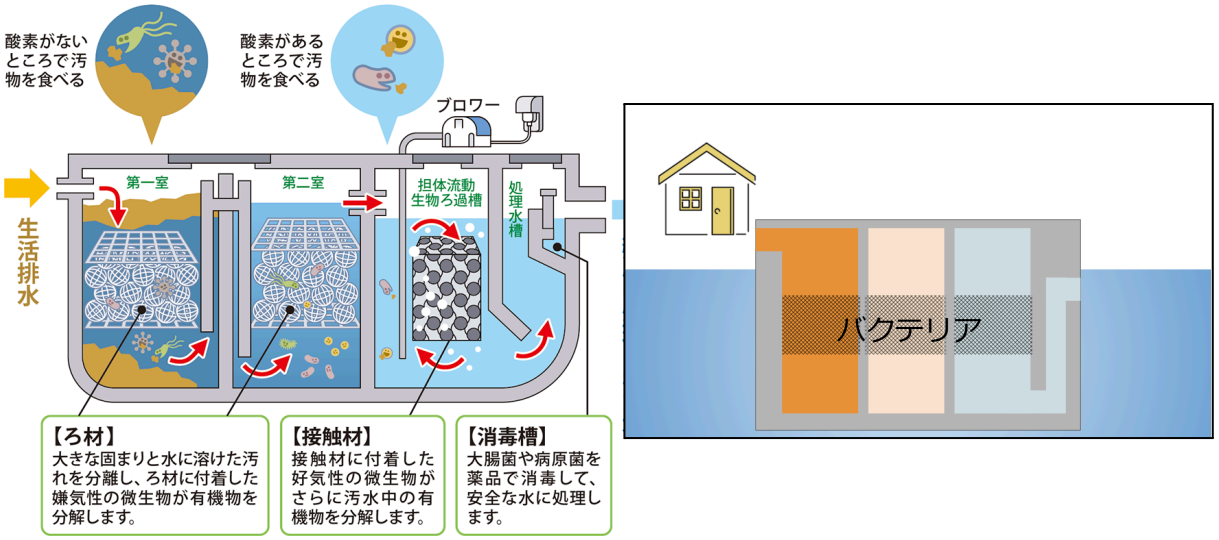

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Strategies for Local Revitalization via Aviation Infrastructure

~Aiming for International Exchange in Regional Cities~

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Abstract

This study explores the impact of aviation infrastructure on the revitalization of regional cities in Japan, addressing issues of depopulation and the over-concentration of resources in Tokyo. By analyzing success and failure cases of airport development, such as Ishigaki and Nakashibetsu, and examining models like Singapore, this research identifies key factors for economic growth. The results indicate that strong connectivity with major hub airports is essential for increasing inbound tourism and stimulating local economies. The conclusion suggests that strategic development of aviation routes can promote international exchange and serve as a vital measure for regional revitalization.

1. Introduction (Background, Significance, and Purpose)

Currently, Japan is facing serious issues such as rural depopulation and the extreme concentration of the population in Tokyo. These trends have led to a declining birth rate and the emergence of "marginal settlements" where communities are at risk of disappearing. This situation poses a significant threat to the Japanese economy. In contrast, many Asian countries are experiencing rapid economic growth. To revitalize local economies in Japan, it is essential not only to promote domestic inter-regional exchange but also to adopt a global perspective that strengthens ties with these growing Asian regions. Therefore, the purpose of this study is to measure the influence of aviation infrastructure on local economies, investigate the models of this influence, and propose concrete policies for regional revitalization in Japan.

1-1. Social Context (Current Situation and Problems)

The population of Tokyo and its three neighboring prefectures continues to grow, showing a degree of concentration 10 to 20 points higher than that of major Western cities. However, this population increase in Tokyo is largely due to the massive inflow of young people. The total fertility rate in Tokyo for fiscal year 2023 was 0.99, the lowest in the nation. Similarly, neighboring prefectures like Saitama (1.14), Chiba (1.14), and Kanagawa (1.13) also have rates significantly lower than the national average. These low rates are thought to be caused mainly by the high cost of living in large cities. Consequently, the concentration of the population in Tokyo accelerates the declining birth rate of Japan as a whole. Revitalizing regional areas would not only increase birth numbers in those regions but also potentially lower living costs in metropolitan areas, thereby improving urban birth rates and contributing to the alleviation of the declining birth rate problem.

1-2. Previous Research

Existing studies on regional revitalization often focus on domestic migration or general infrastructure. However, successful international models, such as Singapore, demonstrate that integrating airport development with industrial planning—specifically placing logistics and

high-value industries near airports and ensuring rapid access to city centers—can drive economic internationalization. While such global hub models exist, there is a need to clarify how Japanese regional cities specifically can leverage aviation infrastructure to achieve similar economic benefits through tourism and international exchange.

1-3. Research Question (RQ)

How does the maintenance and development of aviation infrastructure affect local economies?

1-4. Hypothesis

The hypothesis of this study is two-fold:

1. Establishing aviation routes connecting regional cities with large metropolitan areas improves access and increases the number of foreign tourists, thereby contributing to local revitalization.
2. Enhancing the "hub" function of metropolitan airports helps sustain the increase in foreign tourists.

The reasoning is that improved air routes raise the international profile of regional cities, which often struggle to attract tourists due to poor access. Efficient infrastructure reduces travel time, making these areas more attractive to the growing number of inbound tourists, particularly from Asia. This leads to economic benefits such as job creation and industrial development in accommodation, dining, and transport sectors. Furthermore, if metropolitan airports function effectively as hubs, they can secure more direct flights, reducing the burden of transfers for visitors and expanding tourism options across Japan.

2. Research Method

To verify the impact of aviation infrastructure on regional revitalization, this study collects and analyzes both success and failure cases. Specifically, it examines the process and results of air route development in domestic and international regional cities using statistical data, preceding studies, and information from regional stakeholders. Success cases are defined as instances where infrastructure development led to an increase in foreign tourists and regional economic activation (e.g., new routes, industrial development). Failure cases are those where investment did not yield the expected increase in tourists or economic effect. By comparing these cases, common success factors and causes of failure are identified. Based on these findings, the study proposes concrete measures for regional cities.

3. Results and Discussion

3-1 Results

- **Success Case (Ishigaki Island):** Following the opening of the new Ishigaki Airport in 2013, there was a significant increase in both the number of tourists and tourism consumption compared to previous years.

- **Failure Case (Nakashibetsu):** Data shows a large disparity in passenger numbers when comparing Nakashibetsu to successful island models like Miyako Island.
- **Singapore Model:** Singapore strategically placed aircraft maintenance, repair, and overhaul industries, as well as logistics for high-value cargo, near the airport. Simultaneously, highway networks and public transport connecting the airport to the central business district were developed. This minimized access time, maximized the airport's function as a business hub, and promoted international urbanization.

3-2 Discussion

The comparison between cases such as Ishigaki and Nakashibetsu reveals that the decisive factor is the convenience of connections with major metropolitan hubs (Tokyo). Nakashibetsu Airport has very low convenience, with only one round-trip flight to Tokyo per day. In contrast, Ishigaki Airport maintains high convenience with about five flights to Tokyo per day, even during off-peak periods. This difference in frequency and connectivity directly impacts the flow of people. The Singapore example further highlights that successful aviation infrastructure is not just about the runway but involves integrated urban planning that links the airport efficiently to economic centers. Therefore, for Japanese regional cities, securing frequent and convenient routes to major hubs is a critical condition for realizing the economic benefits of tourism and exchange.

4. Conclusion and Future Prospects

The results of this study validate the hypothesis that aviation infrastructure facilitates exchange between regional cities and metropolitan areas (and internationally), thereby contributing to regional revitalization. The case of Ishigaki demonstrates that improved access directly correlates with tourism growth and economic development. In conclusion, aviation infrastructure plays a vital role in the internationalization and revitalization of regions. However, future policies must also consider sustainable approaches, paying attention to environmental loads and cost-effectiveness. Strategic investment in connectivity is a practical guideline for local economic activation.

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The World and Education

～How to develop a love of learning through efficient education～

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Abstract

I personally dislike studying very much. I considered two ideas for students who dislike studying to enjoy studying efficiently based on previous research. My suggestions are educational manga and AI education robots. I believe these approaches can address the underlying reasons why students hate studying. By doing this, learning will become efficient, and will help students enjoy studying. Moreover, research on AI robots has been progressing rapidly. Considering this potential, I aim to devise solutions applicable even in developing countries.

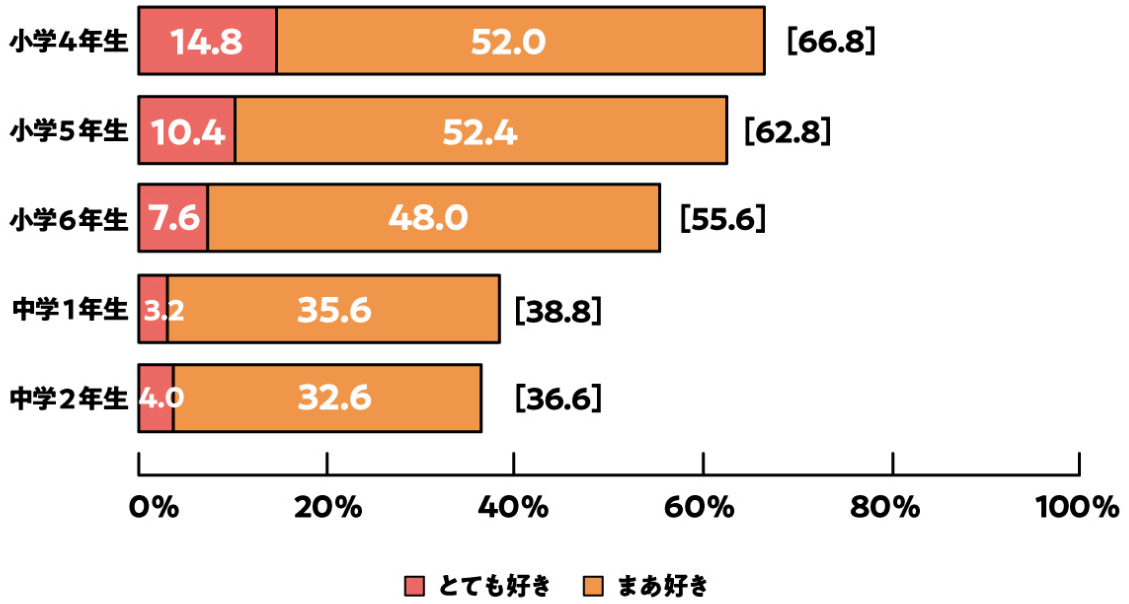
1. Introduction (Background, Significance, and Purpose)

I don't like studying. However、many Asian countries including Japan are educational backgrounds society. Although you cannot realize your dream without studying, there are few people who like studying.Then, I thought that I try to change the awareness of studying because it's difficult to change being an educational background society. While this research was proceeding, I considered that I may be able to do something for studying in countries whose educational system doesn't work well.Therefore, this research's purpose is to express two ideas: how to study efficiently in educational background societies and how to arrange the educational system in developing countries.

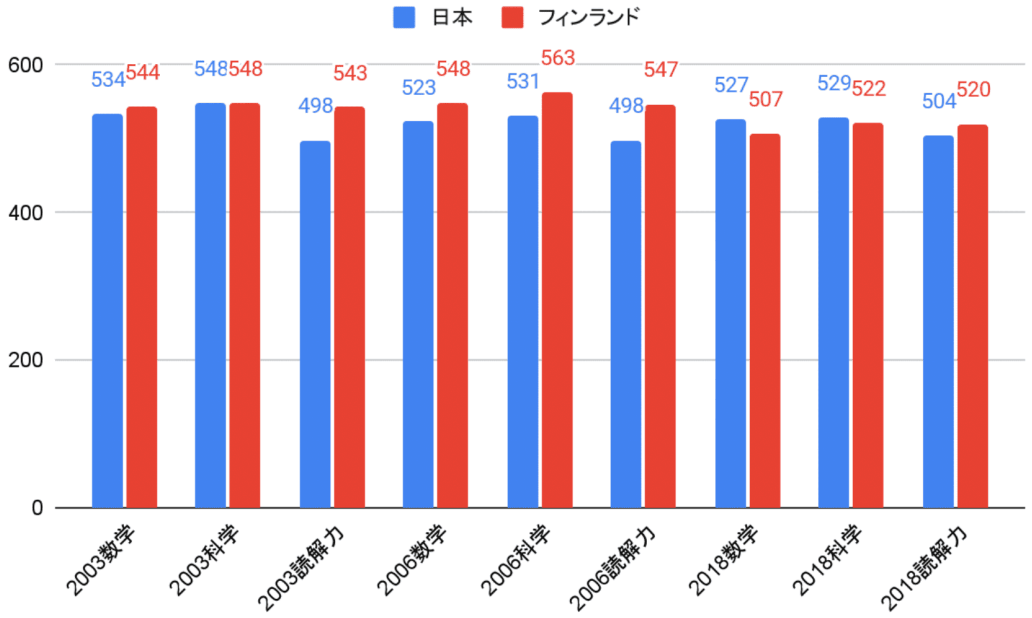
1-1. Social Context (Current Situation and Problems)

There are a lot of children who can't study even though they like learning in the world.There are a lot of children who can't go to school because of household chores or working. World Vision is working on a charity activity called Child・Sponsorship shop for these children. This program involves people in developed countries donating to support children who can't go to school for a certain period of time. There are many activities like this all over the world, however, the world has about two hundred and sixty million children who can't study.(left picture)In contrast to these countries, Japan in which I live, in general, has a good educational system. Despite this, I don't like studying. I feel regions with a good educational system are less interested in studying than regions not keeping.For example, most children who must work for their family and can't go to school admire the opportunity to study, on the other hand, most children who can go to school as a matter of course hate their homework. It's myself and I often find people like this. This issue is also broadcast on TV. I think the cause is that studying has become not special and can't feel the necessity of it. Moreover, it's not a few people who have a

sense of dislike for studying by comparing with others or being forced to study. In this research, I put a research subject who has become hating because the educational system is arranged and can't be satisfied with studying in developing countries.



This chart shows the results of an investigation which asks Japanese students whether they like or hate studying. According to this chart, It seems that the older students have the more awareness of disliking studying. That's because that difficulty increases gradually as students progress through the grades and they will become to think studying is for something as aging. They should have enjoyed getting new knowledge and also loved studying, as growing, these consciousness is decline.I wonder if this issue is found in other countries and checked out. Then I found there are large differences between each region. In Western countries, students seem to grow to like studying as they age. On the other hand, Asian countries including Japan are often educational social countries and students have awareness of disliking studying because they are forced to study since they were young. To speak frankly, these differences came from whether I was being forced or doing it myself. So, why is it bad to dislike studying? This is because if people don't have some educational background, their options of business will decline and they will not be able to try what they like. After people dislike studying, they will not have the habit of studying, they will not be able to enroll in universities that they want to and they will not be able to do what they want to. Of course, there are some people who succeed without becoming to like studying. However, there are only a few of those people and what students learn at the school will be general education. So I think studying is necessary. In addition, Finland, whose educational standard is high in the world, places more importance on quality and more amount of study. Even though Finland actually has less classes than Japan for about forty days, academic ability is ranked high. According to this chart, Finland is ranked higher than Japan in many subjects.



It’s wrong not to need a large amount of studying, but I think students need to study at a high quality. Besides, Rising above, there are many children who can’t study freely in the world. That’s because children in developing countries are needed as labor and don’t have the opportunity to study. Because I research about the educational system, I aim that children in developing countries can study whenever they want to.

1-2. Previous Research

①「学習・勉強嫌いに対する考察ー暗記学習を中心に」Tomohiro Suga

As I mentioned in the article on social trends after reading this paper, I understood that "compulsion" and “big pressure” influence education badly. This paper described that when students hear “studying”, they feel “hate” or “painful”. This is because that they face the result of exams,too and they become to study for exams. It is said that being forced to study cannot keep motivation and students cannot learn better than studying themselves. Also, he mentioned modern methods of education which not only memorize but also try to study with making sense. He said that learning by making sense is definitely important, but not having ways to study if they don’t have stocks of memorization, memorization is also very important. On the other hand, he also said that because the ways of memorizing are wrong, learning ways of memorization have been reviewed. Therefore, it seems that it is also bad to be forced to memorize like other ways of studying. Moreover, he explained that remembering mechanically is not memorization. For example,if students write and read English words earnestly and remember, it won’t be learning. It is mentioned that connecting applied to use in other ways is learning and actual memorization. After reading this paper, I found that not mechanically but voluntarily and trying to apply is the most efficient way.

②「Inside A.I.’s Super Bowl: Nvidia Dreams of a Robot Future」

author：Tripp Mickle, Mike Kai Chen, Loren Elliott

In this paper, a lot of ways of using AI are introduced, and I focused on digital cloning technology. Digital cloning technology is what learns the thinking and acting features of some people or things and reproduces them by making virtual copies in digital space with AI. They can support population shortages and make tasks efficient by doing this.

According to ①②, I make the next research question.

1-3. Research Question (RQ)

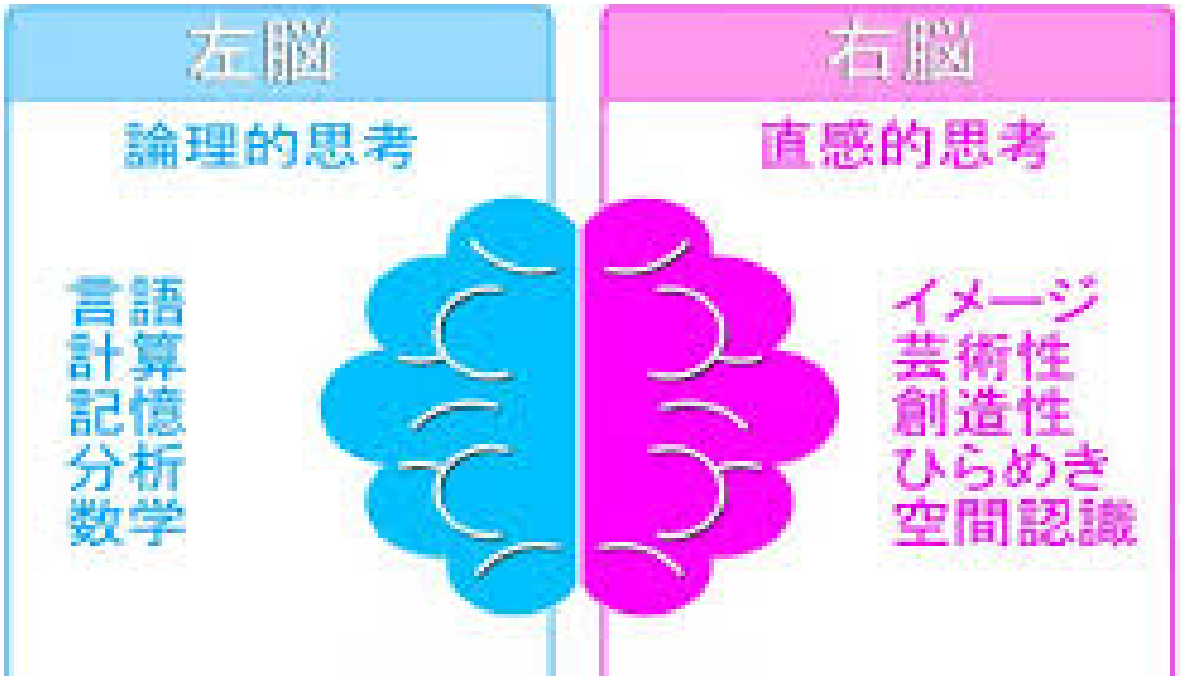
"What kind of efforts are needed to make more people love studying through efficient education?"

As I mentioned before, children have to like studying. If they don't do it, their options in the future will decline. To increase their options in the future, it is important for them to learn not forcing and mechanically but applied with their own ideas. Also, to solve this problem, considering what ideas to become to like studying is the purpose in this research.In addition, I would like to think of a solution to throwing these ideas.

1-4. Hypothesis

①I wonder if manga education has a positive effect on studying.

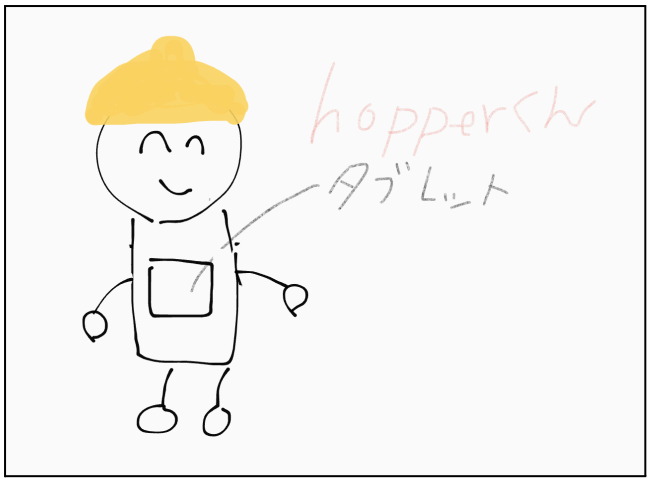
For instance, education with manga like biography influences students well. When I was an elementary school student, I always stayed at the library and I read various biographies. Thanks to this habit, I was interested in many things and I learned many kinds of knowledge. At that time, I regarded these actions as only getting knowledge and I didn't think about why these issues happen. However, I have felt history is fun because merely knowledge for me connected to each other by learning history in classes at junior high school and understanding a phenomenon's background. I think knowledge learning with manga is deeper by education at schools because something which is ingrained in the brain from an early age cannot be easily lost. Manga also has other effects. First, manga is written with pictures and it is said that pictures are more memorable than a string of words in textbooks. That's because students can understand stories easily, so they can understand stories while only reading. Actually, I cannot understand half of the page when I am just reading. However, I sometimes can understand stories while just reading. Second, people use their left brains when they study, on the other hand, they use right brains when they read manga like pictures. It is said that right brains' power of memorization is ten times greater than left brains.（under picture）Therefore I



thought it is easier to memorize with manga-like pictures than to learn with words. Also, people understand contents easily with manga, so they seldom stop doing it because they cannot understand. I thought it is easy to work on and people may be able to study by themselves.

②I wonder if using AI robots makes students study efficiently.

There are many kinds of AI robots around the world and education with them has been done. For instance, there is an AI robot called “Musio X”.(right picture) This is a specialist in English education, so this robot can teach English widely ways, from dialogue in daily life to learning guidance. Students can use it in many ways to control their learning situation with smartphones, to analyse an individual's situation, to provide a learning schedule and to talk together in English. Moreover, Musio X has official clothing and people can enjoy dressing up, so they can make these robots their own robot. I think people will love these robots so much.



I considered that it would be good to use AI robots in not only English but also other subjects based on this and suggested “hopper-kun”. It is named after “home”. (left is image picture) The cap is charmpoint and has many kinds of colors.I thought AI robots are useful for science subjects instead of manga, which is useful for memorization subjects. There are many kinds of AI tools like chatGPT, so it is not necessary to exist as robots. However I think if robots are near students, it will make them motivative and they can learn from not only eyes but also ears. So I expected robots to have a lot of good effects. As there is an example of an image, students can learn from both eyes and ears when hopper-kun teaches them with tablets which express something necessarily. In addition, because AI is good at analysing large amounts of information, I think hopper-kun can analyse an individual’s learning conditions and provides a learning plan which matches each student. Moreover, language learning has “listening”,”reading”,”speaking”,”writing”, and listening and reading are called input, and speaking and writing are called output. It is easy to input themselves, but it is difficult to output themselves. What students can do will be limited when studying at home alone. In addition, according to Artur Gates who is professor of psychology at Columbia university, the golden ratio between input and output is 3:7, so he said that when they input, they should output twice. Then using AI robots, students can increase the efficiency of studying with output which cannot be done alone. For example, in language learning, they dialogue with hopper-kun, explain hopper-kun questions. I thought students can

understand their own learning conditions with hopper-kun and being provided learning plans and commentary easy to understand, students can study efficiently. Moreover, to differentiate other AI educational robots, I want to pursue something useful by putting a whiteboard on part of hopper-kun's body to note something.

③I wonder if digital clone technology is useful to arrange the education system in developing countries.

There is a problem that the number of teachers who can teach steadily is small in countries whose educational system does not arrange. Thus the support of staffing from developed countries has been done, it isn't eternal. So, I thought that it is good to reproduce developed countries' classes in developing countries by using digital clone technology. Then, I expect teachers being there can also learn by watching classes with digital clone technology in developed countries and they will be able to teach better than now. Also, it means increasing the number of teachers, so it will help solve the population shortage of teachers. However, because digital clone technology is copies of people who actually exist, ethical issues have appeared. Therefore, I think it is a good idea to collect volunteers who allow to use their own copies when people use digital clone technology.

【The World and Education】 5333 Yoshida-3

2. Research Method

According to previous research, I focused on manga education and utilization of AI robots. In each way, I'm going to find the merits and demerits and think of a solution to solve the part that was unsolved in previous research. Finally, I'm going to consider ideas to popularize these solutions. In addition, I'm going to think about how digital clone technology is used in this research based on searching for countries which actually use digital clone technology and for conditions and results.

3. Results and Discussion

3-1 Results（結果）

①There have already been many instances about manga education. There are many kinds of history or humans especially. I found that although many schools put them in their libraries, the case studies that use manga in classes are small.

②In AI education, I found that it has already existed by reading previous research, but many of those are used for language learning.

③I discovered an example of using digital clone technology and I understood it is used for new employee training by taking copies of people who got good grades.

3-2 Discussion

It is the result that popularizing education with manga and AI robots make students study efficiently. When they memorize something, they use manga science elementary school

students and are interested in studying by getting new knowledge when they are young. It will connect to get consciousness that studying is fun. However, I think it is limited to learn, so they need to read educational manga and learn the details of the subject at classes in their school. In addition, AI robots make students have a custom of studying at home and throwing dialogue with AI robots, they do input and output hardly. I would like AI robots to handle not only language studying but also a lot of subjects like math and physics. In other words, AI robots are like tutors. Because we have to pay for it, people should develop these AI robots in high quality and at a reasonable price. However, I proceed this research without considering the costs very well. And, by popularizing these AI robots, people will be able to make studying habits since they are young, so it helps them study voluntarily. They will also be able to solidify memories efficiently. And I think that I will be able to decrease their dislike of studying. Moreover, I understood that digital clone technology is useful for training people, thus I thought that it will be possible to use training high quality teachers in developing countries or use this technology as teachers. By doing this, developing countries will be able to arrange a little education systems.

4. Conclusion and Future Prospects

In order to study efficiently, which is the purpose of this research, I suggest popularizing AI education and manga education because I think these ways of education are useful. I hope that doing this will make people who can do what they want to in the future increase by disappearing from being forced and excessive pressures and by studying voluntarily. In addition, I think learning positively at home decreases conflict between parents and children, so lively talking in family will increase. I need to consider how these ideas popularize and how it cost.I think it is not impossible to create hopper-kun because developing and researching AI robots are done around the world. About improving education in developing countries, I propose using digital clone technology in order to solve population shortage and to be taught education efficiently. About this, although various problems still linger, it is good to improve little by little.

People who dislike studying are probably many, however, I thought studying is useful for our future. So students including me should make a habit of studying. Because learning ways which we can enjoy studying things like apps or textbooks with manga, I want to consider ideas not to be painful studying by using them.

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Reduce the number of children under two years old suffering from malnutrition

～Proposed New Ways to Utilize the Maternal and Child Health Handbook～

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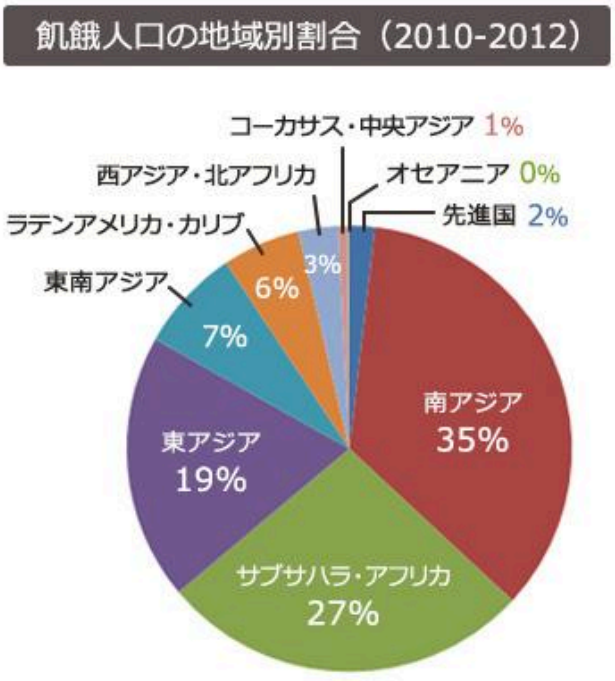
【Reduce the number of children under two years old suffering from malnutrition】5401-Amada

Abstract
This research addresses the serious impact of infant malnutrition in developing countries and proposes the need for a new support method that combines the Maternal and Child Health (MCH) Handbook, nutrition education, and AI technology.Using literature review, I examined previous studies, examples of MCH Handbook use, and AI-based health applications to explore the potential of personalized nutrition support.Findings showed that nutrition education improves infant health and that AI health apps can provide personalized support, suggesting that using MCH Handbook data to deliver customized nutrition guidance is both feasible and effective.AI-assisted nutrition education based on the MCH Handbook could significantly reduce infant malnutrition, and future work should address practical issues such as technological limitations and ethical concerns to develop a realistic implementation plan.

1. Introduction (Background, Significance, and Purpose)

Based on the graph below, it is clear that many children in developing countries suffer from malnutrition.

	極度の食料不足に直面する5歳未満の子どもの人数
アフガニスタン	1,500,710
ブルキナファソ	335,528
コンゴ民主共和国	3,852,060
ハイチ	442,800
マリ	77,762
ニジェール	241,074
ナイジェリア(北東部・北西部)	1,651,700
ソマリア	373,380
南スーダン(南部)	991,250
スーダン	924,800
イエメン南部[2]	587,573
合計	**10,978,637**



This is likely caused by poverty, rapid climate change, and recurring conflicts, which make it difficult for families to obtain enough food or a nutritionally balanced diet.

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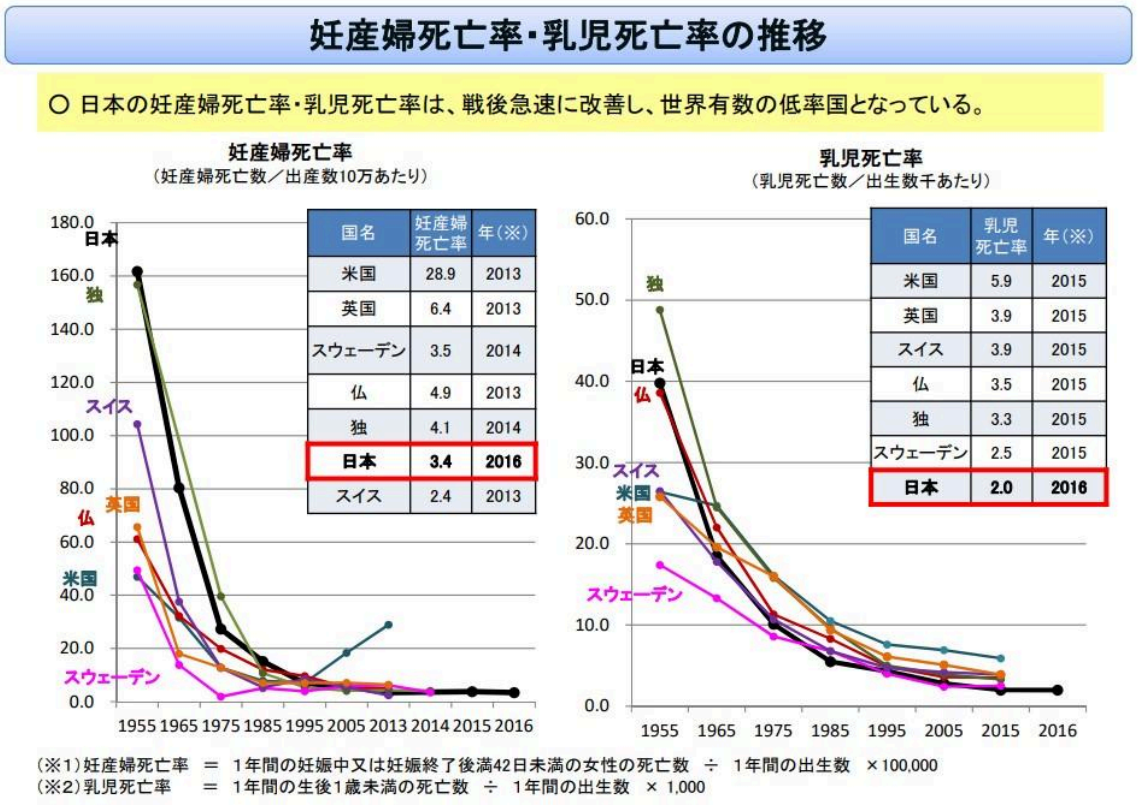
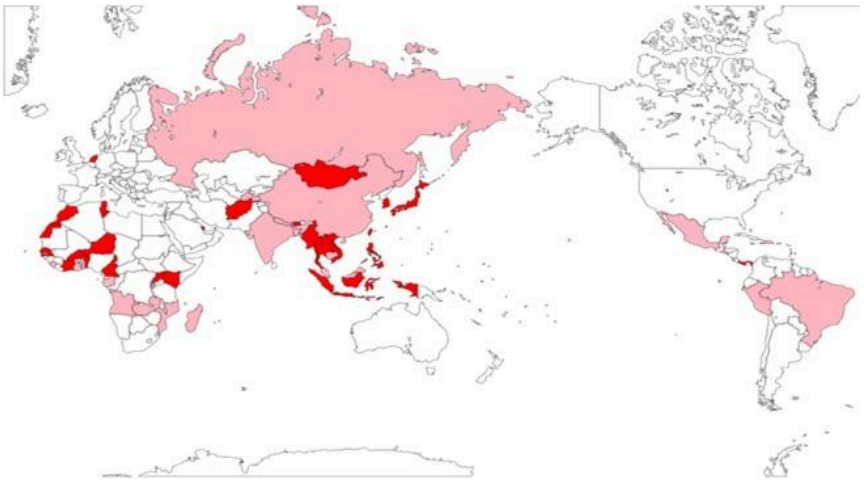
The first question I had in this research was: *What effects does malnutrition in infancy have?*

When I investigated this, I found that infant malnutrition not only delays physical growth but also affects cognitive development. According to Hunger Free World, malnutrition in early childhood can cause intellectual disabilities, reduce the ability to concentrate in school, and lower learning ability and IQ to an irreversible extent. These findings show that providing adequate nutrition during infancy does more than reduce infant mortality—it can change the entire future of a child.

In my research last year, I focused on the spread of the Maternal and Child Health Handbook. This handbook, which Japan started promoting after World War II, is designed to support lifelong health management for children. As shown in the graph below, the mortality rates of mothers and infants declined in Japan after the handbook became widely used.



Furthermore, experts such as Yasuhide Nakamura, the Director of the Japan WHO Association, and organizations such as the Japan International Cooperation Agency (JICA) have been promoting the handbook internationally. As a result, it is now used in about 50 countries.



According to Intensive nutrition education, with or without supplemental feeding improves the nutritional status of moderately malnourished children in Bangladesh,Previous studies have shown that providing nutritional education to mothers is effective in improving the nutritional status of infants. In one study conducted in Bangladesh, malnourished infants were divided into two groups. One group received nutritional education for mothers, and the other group received both nutritional education and nutritional supplements. The results showed improvement in the nutritional status of infants in both groups. This suggests that nutritional education alone can contribute to better infant health, likely because education leads to long-term improvements in dietary practices.

However, the nutritional education in these studies was not personalized. Based on this limitation, I began to consider whether combining maternal and child health handbooks with nutritional education could create a more individualized program. If nutritional guidance could be tailored using information recorded in mother–child health handbooks, the nutritional condition of infants might improve even further.

1-1. Social Context (Current Situation and Problems)

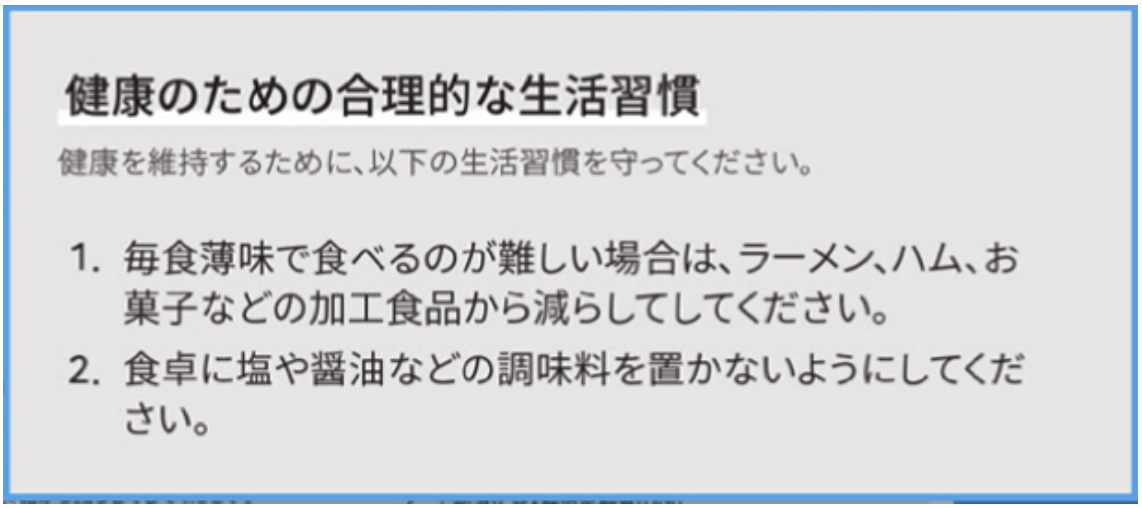
In many developing countries, infant malnutrition remains a serious social issue, with poverty, climate change, and ongoing conflicts limiting families' access to stable and nutritious food. Malnutrition during infancy not only slows physical growth but also causes long-term cognitive delays, which can lead to lower academic performance and reduced job opportunities later in life. Although various international organizations are working to address this problem, support is often inconsistent because many families cannot regularly visit health facilities. This situation highlights the need for a practical and accessible method to support infant nutrition in daily life. Therefore, exploring new ways to utilize the Maternal and Child Health Handbook—combined

with personalized nutrition education—has important social value in protecting the future of children in developing countries.

1-2. Previous Research

In South Korea, an AI company has developed an application called *Selvy Checkup*. By entering 20 items from a user's health examination results, the app predicts the risk of developing ten major diseases.

In addition to disease prediction, the app provides various forms of support, such as lifestyle recommendations and reports showing how a user's risk compares with others in the same age group.



These features help users manage their health effectively and reduce the likelihood of developing serious conditions.

However, researchers have pointed out two major challenges with these AI-based prediction apps.

First, AI predictions are not perfectly accurate. Since the results are only estimates, they cannot be considered certain, and therefore they should be used only as suggestions rather than definitive diagnoses.

Second, there are ethical concerns regarding privacy. Because these apps require detailed health data, protecting personal information and ensuring secure data management are essential.

These findings show that AI can support personalized health management, but also

that accuracy and privacy remain unresolved issues. This leads to my research theme: exploring whether AI-based personalized nutritional guidance, when combined with mother–child health handbooks, can be applied safely and effectively to improve infant nutrition.

1-3. Research Question (RQ)

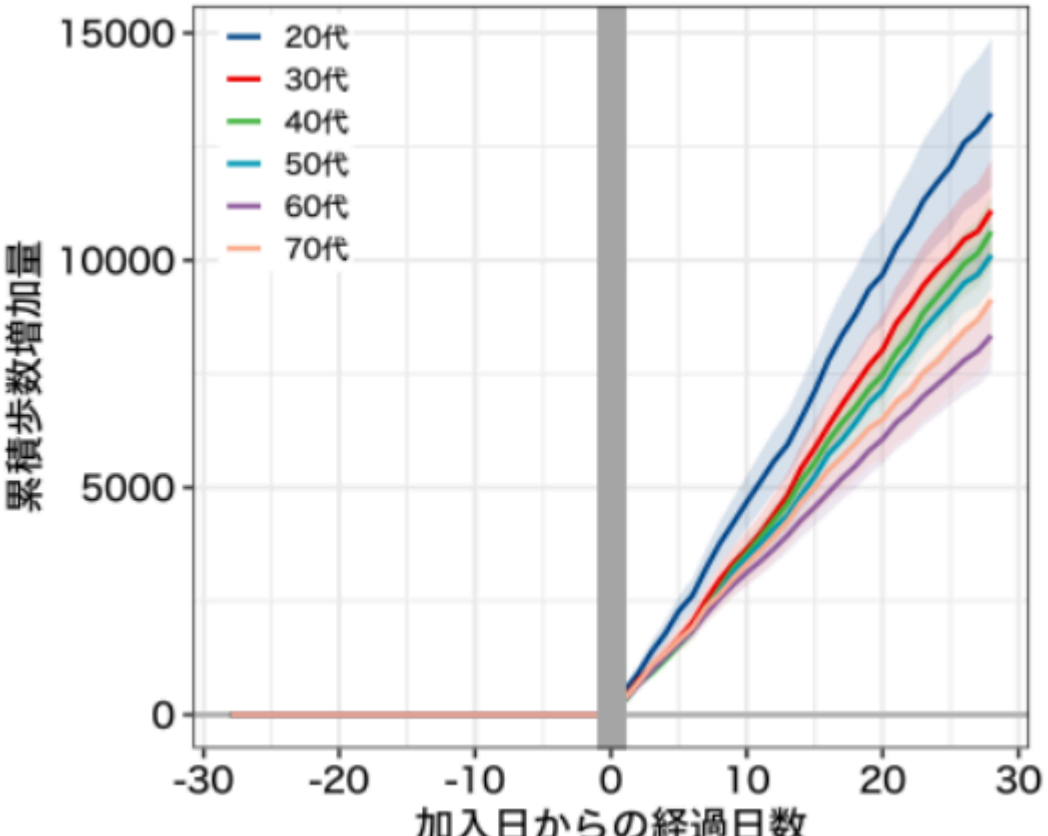
Can mother–child health handbooks combined with AI-based personalized nutritional guidance help reduce malnutrition among infants?

Previous research has shown that nutritional guidance tailored to an individual's health condition, along with regular health checkups, can increase physical activity, improve overall health, and help prevent diseases. If these benefits can also be applied to infants, especially in developing countries, AI-supported personalized nutrition using mother–child health handbooks may contribute to reducing infant malnutrition. Therefore, I chose this research question to explore whether such an approach could be effective.

1-4. Hypothesis

I hypothesize that combining the Maternal and Child Health (MCH) Handbook with AI will enable personalized nutrition education and lead to an improvement in infant malnutrition.

In recent years, many health-management applications have been developed. Some apps predict disease risks based on health checkup data, while others record daily weight and physical activity to help prevent lifestyle-related diseases. These technologies show that personalized support based on individual data can lead to healthier behavior.



According to data from Osaka University, people who used health-management apps increased their physical activity compared to before using the app. This suggests that regular, personalized health guidance delivered through digital tools can effectively improve users' health behavior.

Applying this idea to infant nutrition, the MCH Handbook already contains important data such as weight, height, and growth history. If AI analyzes these data and provides tailored nutritional advice—such as showing growth indicators, visualizing nutrient balance, and suggesting foods to supplement missing nutrients—mothers can make better decisions in their daily feeding practices.

Based on these findings, I propose that personalized nutrition education using an AI-supported MCH Handbook will likely improve infants' nutritional status. This approach can help mothers receive continuous guidance anytime and anywhere, making it a practical and effective solution in developing countries.

2. Research Method

I used a literature-review method focusing on three major areas:

Infant nutrition and malnutrition in developing countries,
The current use and challenges of the MCH Handbook,
Innovative health-technology tools such as AI-based prediction systems.
I read an international study conducted in Bangladesh, which analyzed how nutrition education affects moderately malnourished infants. In addition, I researched "Selvy Checkup," a Korean AI system that analyzes health data and predicts disease risks. By comparing these sources, I tried to connect traditional maternal-health tools with new technology.

3. Results and Discussion

3-1 Results

・Intensive nutrition education, with or without supplemental feeding improves the

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nutritional status of moderately malnourished children in BangladeshS.K. Roy、G.J. Fuchs, Zeba Mahmud, Gulshan Ara, Sumaya Islam, Sohana Shafique, Syeda Sharmin Akter and Barnali Chakrabortyspringer nature

Both the nutritional education alone group and the nutritional education plus supplement group improved the nutritional status of infants.

上位20カ国	%	下位20カ国	%
1 モロッコ	88	35 リベリア	34
2 セイシェル	82	36 ガンビア	33
3 チュニジア	79	37 アンゴラ	33
4 ボツワナ	74	38 タンザニア	32
5 南アフリカ	72	39 ルワンダ	30
6 エジプト	72	40 ケニア	29
7 ガボン	72	41 コモロ	27
8 アルジェリア	71	42 マラウイ	24
9 カーボベルデ	70	43 コンゴ	23
10 ジブチ	69	44 ニジェール	22
11 ガーナ	68	45 エリトリア	22
12 モーリシャス	68	46 ブルキナファソ	22
13 エスワティニ	59	47 ザンビア	21
14 モーリタニア	59	48 マダガスカル	20
15 セネガル	58	49 チャド	18
16 ナイジェリア	55	50 モザンビーク	17
17 赤道ギニア	54	51 エチオピア	17
18 ナミビア	53	52 中央アフリカ	11
19 サントメ・プリンシペ	51	53 ウガンダ	10
20 レソト	48	54 ブルンジ	6

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  - The internet penetration rate in Sub-Saharan Africa is 25%, and 45% for those aged 15 and over.

4. Conclusion and Future Prospects

【Reduce the number of children under two years old suffering from malnutrition】5401-Amada

My research focused on finding effective ways to improve infant nutrition using the Maternal and Child Health (MCH) Handbook. Based on the evidence I examined, I concluded that providing personalized nutrition education using the information recorded in the MCH Handbook can help improve infants' nutritional status and reduce the number of malnourished children.

In my proposal, the app calculates the Kaup Index from data such as weight and height recorded in the MCH Handbook, visualizes the nutritional balance of daily meals, and suggests foods that can supplement missing nutrients. It also recommends visiting a medical institution when necessary. By offering this support through a mobile application, mothers can receive nutrition guidance anytime and anywhere.

Because internet access and smartphone use have been rapidly increasing in urban areas of developing countries, and studies have shown that regular nutrition education through health apps is effective, I believe this proposal is both feasible and beneficial.

Reducing the number of malnourished infants has significant social meaning. Improving infant nutrition contributes to healthier growth, better learning outcomes, and future From now on, I hope to deepen my understanding of AI, preventive medicine, and data ethics. I also want to consider how to make the app usable in environments with limited technology or unstable internet access.productivity, which can support the long-term development of society.

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Will you be healthy in four years? Or...? AI predicts the incidence rates of 10 major diseases including cancer Selvy Checkup Latest version launched in Japan November2018https://newscast.jp/smart/news/0527759

【Reduce the number of children under two years old suffering from malnutrition】5401-Amada

People who start using mobile health apps take more stepsAI analysis of Osaka Prefecture's health app "Asmile" demonstrates its effectiveness
https://resou.osaka-u.ac.jp/ja/research/2025/20250521_2

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Africa’s Water Problem (14 pt)

～How to avoid wasting exist water~(12pt)

群馬県立中央中等教育学校

ID 5402 氏名 入内島颯崇

Abstract

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

Many people in Africa still face water scarcity and water pollution. In rural areas, clean water sources are often far from homes. Women and children spend many hours carrying water, which affects education and health. Climate change and population growth make this problem more serious.

1-2. Previous Research

Previous studies focused mainly on climate change, drought, and large infrastructure such as dams and pipelines. Other research showed that point-of-use technologies, like household water filters, can improve water quality. However, fewer studies focused on how to transport water from sources to

homes at low cost.

1-3. Research Question (RQ)

How can water be transported from local water sources to households in a low-cost and simple way, while also improving water quality?

1-4. Hypothesis

If communities use simple water transport systems, such as gravity-fed pipes, handcarts, and community water kiosks, together with household storage tanks and bottle-type water purifiers, water access can be improved at low cost.

2. Research Method

This paper uses case studies of countries that had water problems in the past but improved their situation. The focus is on simple and low-cost methods. The cases are Bangladesh and Rwanda. Information is compared to evaluate how water transport and household storage can work together.

3. Results and Discussion

3-1 Results

Case 1: Bangladesh

Bangladesh suffered from water pollution and waterborne diseases. Many people used contaminated surface water. To solve this, the government and NGOs introduced hand-pumped tube wells. These wells bring groundwater closer to villages. People do not need to walk long distances.Water transport in Bangladesh is very simple. Water is collected directly from nearby wells using containers. Households store water in plastic tanks at home. Recently, low-cost bottle-type water filters have been used to improve water quality further. This system is cheap, easy to repair, and managed by local people.

Case 2: Rwanda

Rwanda had serious water shortages, especially in rural areas. The country introduced gravity-fed water systems. Water flows from springs in higher areas to villages through simple pipes. This system does not need electricity, so the cost is low.In many villages, water kiosks were built. People collect water there and carry it home using jerry cans or small handcarts. At home, water is stored in household tanks. Some families use portable water purifiers to remove bacteria. As a result, access to clean water increased, and time spent collecting water decreased.

Current Situation of Water Problems in Africa

Today, water scarcity is a serious problem in Africa. According to international organizations, about 400 million people in Africa do not have access to basic drinking water. In Sub-Saharan Africa, around 1 in 3 people must use unsafe water from rivers, lakes, or ponds.Because of unsafe water, many people suffer from diseases. It is reported that more than 300,000 children under five die every year from water-related diseases such as diarrhea. In addition, women and children often spend over 30 minutes a day walking to collect water, which reduces time for

school and work.

How Portable Water Filters and Storage Tanks Can Help

Bottle-type water purifiers can help solve water quality problems. These filters can remove bacteria and dirt from contaminated water. They are cheap, easy to use, and do not need electricity. This makes them suitable for rural areas.Household water storage tanks help solve water quantity problems. Families can store water collected from wells, rivers, or community water points. This reduces the need to collect water many times a day.By combining portable water filters and household storage tanks, families can get safer water at low cost. This system improves health, saves time, and can be used even in poor and remote areas.

3-2 Discussion

These cases show that low-cost water transport is possible without large infrastructure. The key point is shortening the distance between water sources and households. In Bangladesh, tube wells reduced distance. In Rwanda, gravity-fed pipes moved water naturally.For Africa, a similar system can be used. First, identify local water sources such as springs, rivers, or rainwater. Second, transport water to community points using gravity-fed pipes or simple pumps. Third, households carry water using containers or handcarts, which are cheap and easy to make. Finally, water is stored in household tanks and cleaned using bottle-type purifiers.This system is flexible. It can be adjusted to local geography and community size. It also creates local jobs for maintenance. Compared to large dams or long pipelines, the cost is much lower

4. Conclusion and Future Prospects

This study shows that combining simple water transport methods with household storage tanks and portable water purifiers can effectively reduce water scarcity. Case studies from Bangladesh and Rwanda prove that low-cost solutions can work.In the future, African communities can expand these systems by using rainwater harvesting and improving local management. Education about water hygiene is also important. By focusing on simple technology and community participation, sustainable water access can be achieved at low cost

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Toward Solving the Cosmetic Waste Problem

～How We Can Avoid Wasting Both Containers and Contents～

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ID 5403 氏名 臼井 茜

Abstract （研究の概要）

This study focuses on the problem of cosmetic waste, known as “cosme loss,” and aims to explore systems that allow for the efficient recycling of makeup containers and their contents. Through research on the activities of the “Plus Cosme Project” and the current state of cosmetic recycling, the study hypothesizes that upcycling unused cosmetics and promoting refillable products can effectively reduce cosmetic waste. The results reveal the importance of placing cosmetic collection boxes, collaborating with donation organizations, and upcycling cosmetics into art materials. However, challenges such as transportation and recycling costs remain. Future efforts should focus on raising consumer awareness and expanding initiatives to include skincare products and makeup tools.

1. Introduction (Background, Significance, and Purpose)

Although cosmetics are an essential part of daily life for many people, the environmental impact of how these products are produced, purchased, and disposed of has not been widely discussed. While sustainability has become a major topic in fields such as food, fashion, and packaging, research on waste within the cosmetics industry remains limited. Many consumers are unaware of how their purchasing habits influence waste, and companies face challenges in balancing marketing trends with responsible product management.

Another concern is that clear data and standardized methods for measuring cosmetic waste are still lacking. Without understanding how and why cosmetic waste occurs, it is difficult for society to create effective solutions. This gap highlights the need for research that examines the behaviors, systems, and industry structures that contribute to unnecessary disposal.

The purpose of this study is to explore the underlying factors behind cosmetic waste and investigate potential strategies that could reduce its environmental impact. By analyzing current practices and identifying areas for improvement, this research aims to contribute to the development of a more sustainable and efficient use of cosmetic products.

1-1. Social Context (Current Situation and Problems)

In recent years, the global cosmetics market has continued to grow and is expected to expand further. While sales are increasing and new products using advanced technologies are being released, the cosmetics industry is also facing the growing challenge of sustainability. Many makeup products are thrown away without being fully used, including unopened or unsold items. This issue, called the “cosme loss problem,” has gained global attention as a significant form of environmental waste.

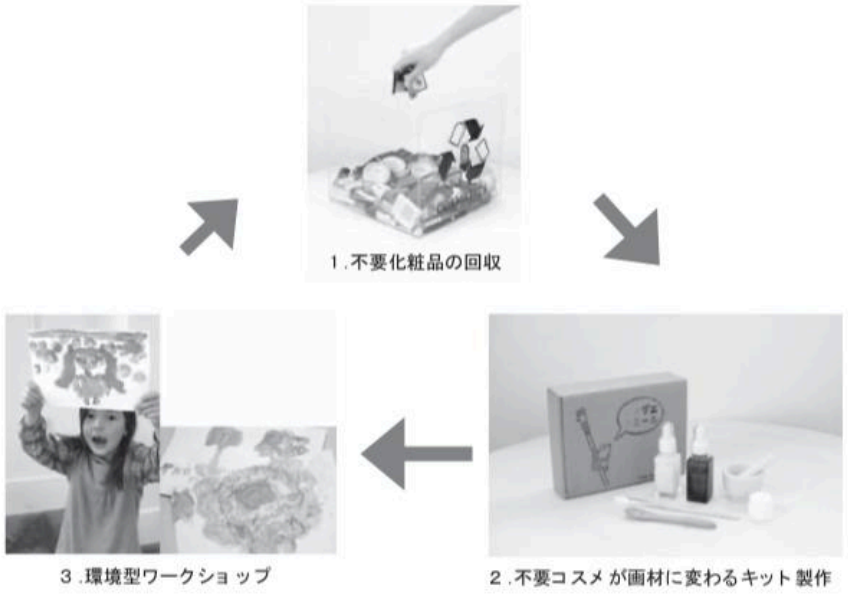
Cosme loss not only contributes to unnecessary resource consumption but also increases

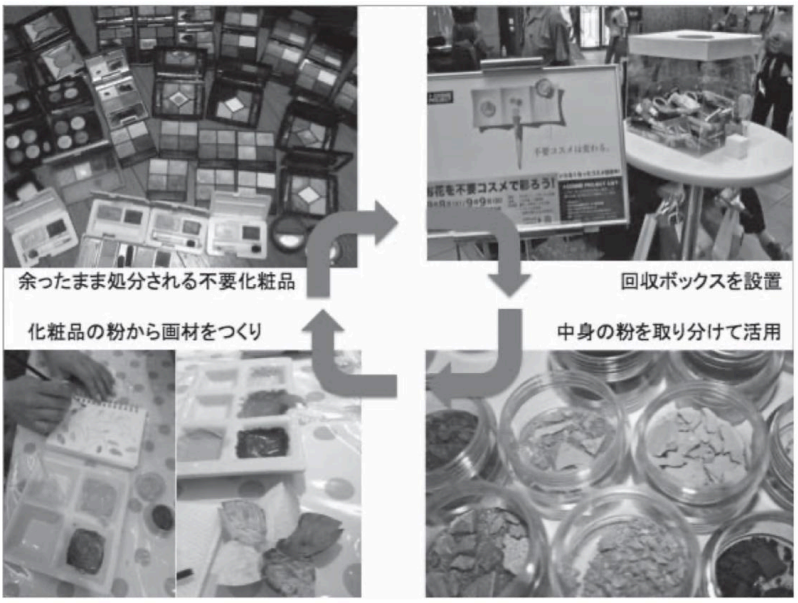
plastic waste and carbon emissions. Finding ways to reuse or recycle cosmetics without discarding them is essential for reducing environmental impact and promoting a circular economy. Addressing this issue will require cooperation among consumers, cosmetic companies, and governments.

1-2. Previous Research

Previous studies have examined initiatives such as the “Plus Cosme Project,” a volunteer organization that reuses unwanted or leftover makeup products as art materials. Through workshops, the project raises awareness about environmental issues related to cosmetics.

According to Sakaguchi (2014), one major challenge is creating a cooperative system among companies, local governments, and organizations to enable the recycling of both cosmetic containers and contents. Another important issue is to continuously promote the installation of collection boxes for unused cosmetics and encourage voluntary participation.





1-3. Research Question (RQ)

This study explores the question:
“What is necessary to recycle both the containers and contents of unused or unsold makeup products instead of discarding them?”

The goal is to propose an effective system that minimizes waste in both aspects. Although cosmetics include various categories such as skincare and fragrance, this study focuses solely on makeup products.

According to a survey by Moongata Co., Ltd., more than 80% of users in Japan dispose of their cosmetics without finishing them. Furthermore, an independent investigation revealed that the top five cosmetic manufacturers in Japan generate about 20,000 tons of cosmetic waste annually from unused contents during production. Including unsold products, samples, and store testers, the total waste amount is even greater.

A study by the British waste management company Biffa also found that about 1 billion cosmetic containers are produced globally each year, yet only 14% are sent to recycling facilities, and only 9% of those are actually recycled. Since it takes over 400 years for plastic to naturally decompose, promoting recycling systems for cosmetic containers is an urgent global issue.

■活用に仕方に困っており、なかなか捨てられないが、結局は捨てる（45.4%）
■何も考えず捨てる（40.9%）
■余らないよう使い切る（9.7%）
■別の方法で使い切る（4.0%）

余ったコスメに対する認識調査
（朝日放送テレビonnelaにおける弊社独自調査）
調査人数：5,423、 期間: 24 時間 (2021/6/22～6/23)

提供：株式会社モーンガータ

1-4. Hypothesis

To reduce the waste of unused or unsold cosmetics, it is necessary to (1) use products until the end whenever possible, and (2) repurpose those that can no longer be used. Regarding containers, increasing the availability of refillable products can significantly reduce disposable packaging waste. Furthermore, using eco-friendly materials for cosmetic containers is an effective strategy.

As for the contents, this study proposes initiatives similar to the “Plus Cosme Project,” where unwanted cosmetics are collected and upcycled into crayons or paints, preventing any leftover products from being wasted.

2. Research Method

To verify this hypothesis, information about the “Plus Cosme Project” was collected through online research, and actual cosmetic donation activities were examined. The goal was to identify challenges in the current project’s system.

Additionally, since the “Plus Cosme Project” mainly focuses on solid makeup items such as eyeshadows and blushes, further research was conducted online to identify initiatives addressing liquid-type cosmetics such as mascara or nail polish, which are not yet included in current recycling efforts.

3. Results and Discussion

3-1 Results（結果）

Currently, the “Plus Cosme Project” occasionally installs collection boxes in different locations across Japan. However, the collection periods and locations are limited. Although postal donations are available year-round, shipping costs must be paid by the sender, which discourages participation from many consumers.

Online research also revealed that the NPO World Gift accepts cosmetic donations, and many similar organizations around the world conduct related activities.
These findings highlight both the growing awareness of cosmetic waste and the logistical and financial challenges that hinder wider participation.

3-2 Discussion（考察）

The findings of this research suggest that current cosmetic recycling systems face several practical barriers that limit their effectiveness. In the case of the Plus Cosme Project, collection boxes are available only at specific locations and for limited periods, which makes it difficult for many consumers to participate. Although postal collection is offered, the requirement for users to pay shipping costs likely reduces motivation to donate. These issues indicate that a recycling system must not only exist but also be easily accessible and affordable for the public.

The research also highlighted a significant gap between the treatment of solid and liquid cosmetics. Solid products can be upcycled into art materials, but liquid cosmetics—such as mascara, foundation, or nail polish—remain challenging to handle and are often excluded from recycling initiatives. This imbalance shows the need for further technological development and new methods that can process a wider variety of cosmetic products.

In addition, while donation organizations and companies are beginning to take action, their efforts are not yet sufficiently connected. Without coordination among consumers, manufacturers, retailers, and nonprofit groups, the overall impact of these activities may

remain limited. Establishing partnerships and sharing responsibilities among different stakeholders could lead to a more efficient and sustainable system.

Overall, the results indicate that reducing cosmetic waste will require improvements in accessibility, expansion of recycling technology, and stronger collaboration across different sectors. Addressing these points could create a more comprehensive and effective approach to the cosme loss problem.

4. Conclusion and Future Prospects

In conclusion, creating a system to collect and recycle both cosmetic containers and contents from consumers and manufacturers is essential for reducing cosmetic waste.
For consumers, the system should include installing collection boxes in department stores worldwide, where unused cosmetics can be donated. The collected products would be separated into reusable and non-reusable items:
Reusable cosmetics can be donated through organizations to developing countries.
Non-reusable cosmetics can be upcycled into art materials through the “Plus Cosme Project,” while their containers are recycled as plastic materials.
For manufacturers, the system should involve collecting cosmetic waste from production lines, classifying it similarly, and either donating or upcycling it.
Such a system would create a win-win relationship, reducing cosmetic waste while supporting people who cannot afford cosmetics.

However, issues related to logistics and recycling costs remain unsolved. Future studies should examine how to fund these expenses effectively. In addition, because cosmetic ingredient regulations differ greatly among countries and regions, safety and quality cannot always be ensured in the same way. Future research should also explore how to manage these regulatory differences in donation and recycling systems.

To reduce cosmetic waste, every consumer should first aim to use up their cosmetics completely. When this is not possible, they should actively participate in collection and recycling programs.
Although many global initiatives focus on makeup products, fewer efforts address skincare products and makeup tools such as puffs and brushes. Therefore, future research should expand to include these categories.

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Improve lifestyle-related diseases in developed country

～To get healthy by using Matcha cultivation~

群馬県立中央中等教育学校

ID 5404 氏名 大槻凛子

【Improve lifestyle-related diseases in developed country】 5404 Otsuki

Abstract
In recent years, lifestyle-related diseases have become a serious issue in many countries. To address this problem, I propose using matcha, which is a representative part of Japanese traditional culture. I suggest that Japan and the United Arab Emirates (UAE) form a partnership in which Japan provides matcha cultivation technology and guidance to help reduce obesity, which is a noticeable issue in the UAE. Along with this, Japan should introduce the culture of sado (the tea ceremony) to promote mental health. The goal of this research is to explore how matcha cultivation can be adapted to the desert climate of the UAE. I examined this topic from five perspectives, and then created an ideal model of matcha cultivation to consider its feasibility.

1. Introduction (Background, Significance, and Purpose)

I belong to the Sado club and was interested in matcha. Learning that matcha contains various nutrients, I thought it might be possible to introduce matcha to people around the world and contribute to their health.

1-1. Social Context (Current Situation and Problems)

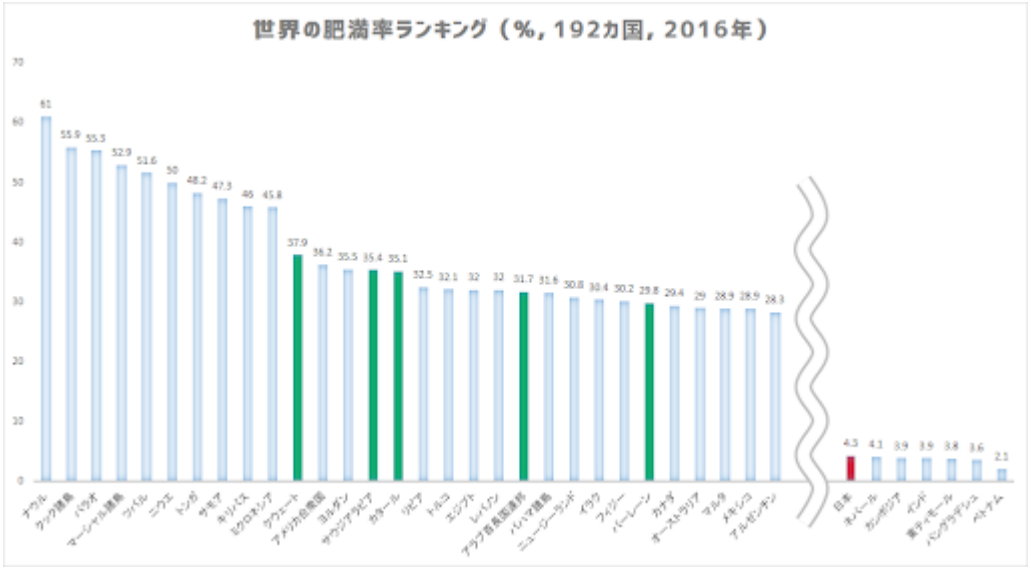
In recent years, lifestyle-related diseases have become a noticeable issue around the world. According to the World Health Organization's (WHO) World Health Statistics 2012, the total number of deaths worldwide in 2008 was 57 million. Of these, 36 million people — about 63% — died from non-communicable diseases (NCDs) such as stroke, cancer, heart disease, diabetes, hypertension, and atherosclerosis. This shows that lifestyle-related diseases have become a serious problem in many countries.

1-2. Previous Research

Various studies have demonstrated the beneficial effects of matcha on lifestyle-related diseases. These findings suggest that matcha may be effective in preventing or improving such diseases worldwide. However, there have been no documented cases of matcha being practically used to address lifestyle-related diseases, and concerns about costs and other factors remain significant. Other research has shown that it is possible to cultivate crops in desert environments. In addition, Pure Harvest Smart Farms in the United Arab Emirates (UAE) has achieved desert agriculture through advanced greenhouse systems and vertical farming. Based on Controlled Environment Agriculture (CEA), the company grows tomatoes, leafy greens, and other crops, aiming to establish a stable, import-independent food supply while reducing costs. Therefore, it can be said that cultivating matcha in greenhouses is also feasible in the UAE.

1-3. Research Question (RQ)

How can matcha cultivation methods suited to desert climates be established in the United Arab Emirates (UAE) to help reduce the number of people suffering from lifestyle-related diseases? First, by focusing on a single country, Japan and the UAE can form a partnership as a model to simplify the process of matcha cultivation and its promotion. Since the UAE has a high prevalence of obesity and lifestyle-related diseases, this approach could also contribute to addressing these health issues.



(Created by the blog author based on CIA World Fact Book)

Furthermore, to eliminate concerns about cost, the UAE was chosen as it is one of the economically prosperous nations among developed countries.

1-4. Hypothesis

Utilize advanced technologies such as greenhouse cultivation to recreate conditions similar to Japan’s climate. In addition, promote matcha as a culturally significant beverage to encourage its widespread adoption among the population.

2. Research Method

Research the essential elements required for matcha cultivation using various online sources, and then consider what would be necessary for cultivation in the United Arab Emirates.Create illustrations to visualize the ideal type of facilities. If time permits, interview experts in matcha cultivation to confirm which facilities would be practically feasible and refine the design based on their feedback.

3. Results and Discussion

To promote matcha among UAE residents, strategies such as placing matcha products in as many supermarkets and convenience stores as possible and offering them in school lunches will be implemented. Serving matcha in school lunches is expected to foster health-conscious

habits from an early age. Furthermore, incorporating the culture of matcha itself is believed to contribute to mental stability and help reduce mental health issues, making it important to integrate matcha into education.

Next, regarding the climate: matcha is traditionally produced in relatively cool areas along the upper and middle reaches of rivers where morning mist rises.

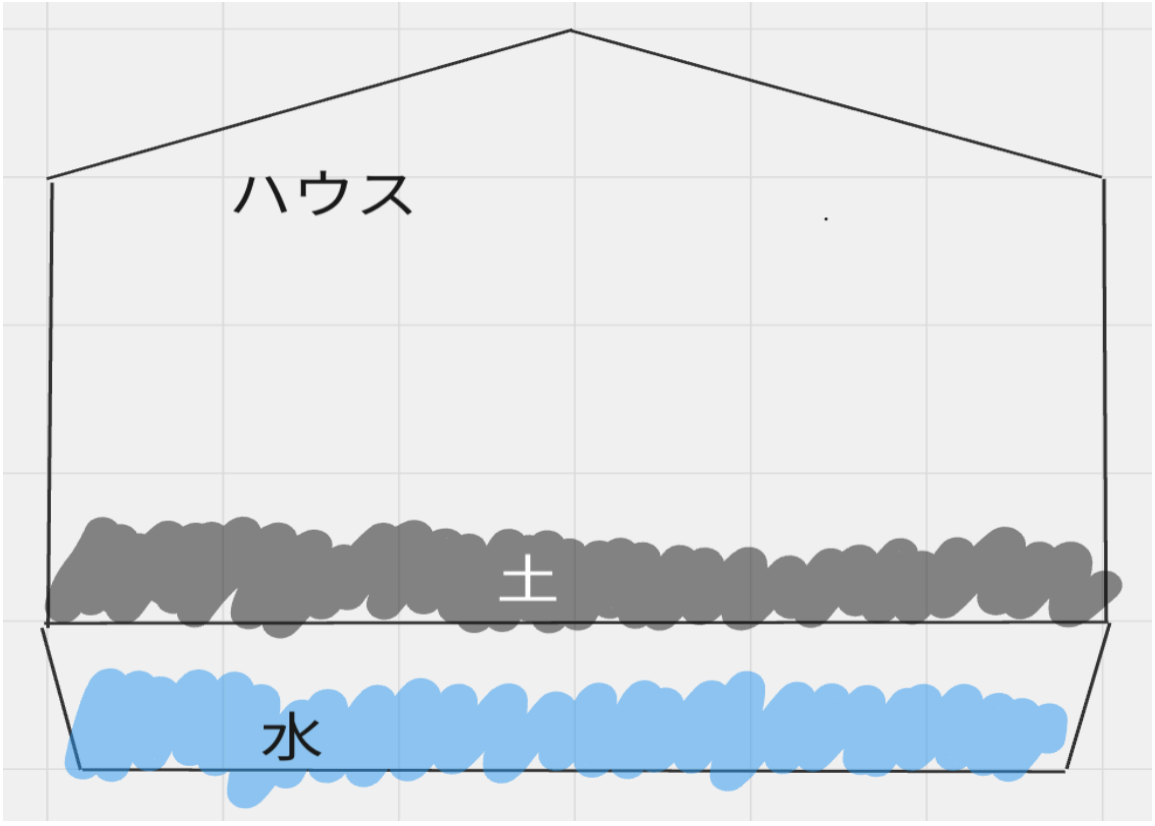
To replicate these conditions, plastic greenhouse cultivation will be used to regulate temperature, with mist-generating devices operating inside the greenhouses.

These devices are also commonly used for humidification in commercial settings, and it is considered feasible to modify them into more suitable models.

Secondly, good drainage and ventilation are required. Desert climates are naturally dry and well-ventilated. For drainage, a system such as the one described below is being considered.

This design involves creating a space beneath the soil that allows water to pass through.

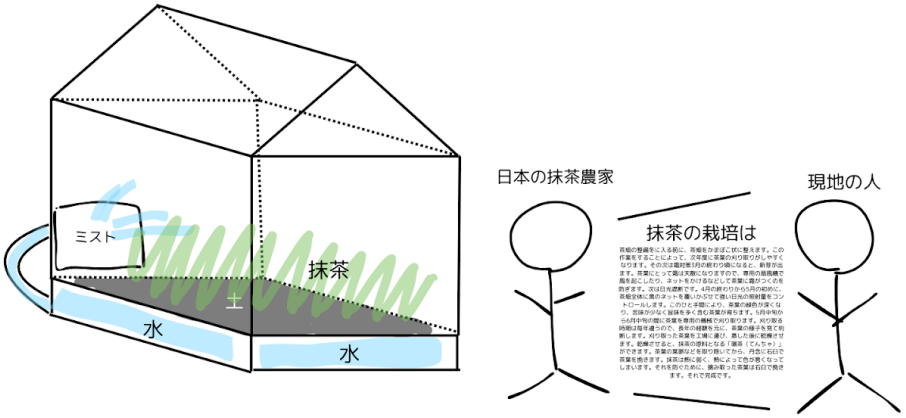
Furthermore, it is believed that this water could be reused for humidification purposes.



The third point states that “red soil produces tea with a rich aftertaste and a long-lasting finish.” Although there are deserts with red soil, the UAE’s desert soil is not red, so imports would be necessary. The Namib Desert, for instance, has red soil, making the import of such soil a possible option. However, it is unclear whether desert red soil is identical in composition to other types of red soil. The main component of red soil is iron oxide (particularly ferric oxide), and any soil containing ferric oxide is classified as red soil. Since ferric oxide is the key element required for matcha cultivation, using desert red soil should not pose a problem. Fundamentally, red soil is naturally low in nutrients, and therefore soil improvement is necessary for agricultural use. While red soil has good drainage, it also has low water retention capacity. For agricultural purposes, adding organic fertilizers or compost to enhance both water retention and nutrient content is recommended. As this practice is consistent with that used in Japan, further discussion will be omitted.

The fourth point mentions “reducing yield to improve quality,” but this will be omitted, as the objective is to provide as much matcha as possible to UAE residents. The fifth point is to “maximize the potential of tea.” Since cultivation in desert climates is rare, it would be beneficial to dispatch Japanese experts in matcha cultivation to the UAE to propose and refine cultivation methods suited to the local climate.

Ultimately, the goal is to achieve the structure illustrated in the figure below.



First, to make use of well-draining red soil, a space is created beneath the soil to store water. Above this layer, a misting system is installed for humidification (to reproduce mist conditions), reusing the stored water for mist generation. Although not shown in the diagram, the installation of a water purification system is also being considered to convert the stored water into mist. Furthermore, using a greenhouse facilitates temperature control and helps block excessive sunlight, thereby providing a more suitable environment for matcha cultivation.

The individuals shown on the right represent Japanese matcha farmers and local residents.

Ideally, Japanese matcha farmers would provide training sessions on cultivation methods for the local people, enabling them to continue matcha production sustainably in the future.

In addition, the United Arab Emirates has already achieved desert agriculture through advanced greenhouses and vertical farming techniques, suggesting that matcha cultivation could also be feasible. Given the desert environment, it would be beneficial to explore cultivation methods adapted to desert conditions, including through selective breeding and other variety improvement efforts.

4. Conclusion and Future Prospects

If a cultivation method for matcha can be developed that works even in the desert climate of the United Arab Emirates, I believe that Japanese matcha will spread more widely around the world, allowing people everywhere to experience the culture of matcha and the tea ceremony. While I presented the UAE as a model, it would be even more desirable if matcha cultivation could become possible in other countries as well. In this study, I did not take cost factors into consideration. However, in order to expand this initiative to a broader scale in the future, it will be necessary to take economic feasibility into account.

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【Improve lifestyle-related diseases in developed country】 5404 Otsuki

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The Current State of PET Bottle Recycling in Europe

~ Initiatives for a Sustainable Future ~

群馬県立中央中等教育学校

ID５４０５　氏名　尾上真悠

Abstract

This study focuses on increasing PET bottle recycling rates in developing countries within Europe as a way to help reduce economic disparities within the region. In many of these countries, low recycling rates are caused by several challenges, including insufficient infrastructure, economic limitations, low public awareness, and reliance on exporting plastic waste.

In contrast, European developed countries such as Sweden and Germany have achieved high recycling rates through deposit return systems. These systems require consumers to pay a small deposit when purchasing beverages and receive a refund when returning empty containers. The mechanism effectively encourages participation in recycling and reduces waste.

The aim of this research is to clarify how such deposit systems can be introduced in developing European countries by adapting to their specific conditions. The study analyzes the initial and operational costs of implementing the system, examines its economic and social impacts, and includes on-site observations conducted in Germany.

The findings indicate that although introducing a deposit system requires substantial initial investment, long-term operation is feasible due to mechanisms such as unclaimed deposits. In addition, the system can bring broader social benefits, including increased environmental awareness and job creation.

This research seeks to propose a practical and sustainable path for implementing deposit return systems in developing European countries.

1. Introduction (Background, Significance, and Purpose)

1-1 Background

Economic inequality within Europe has been a long-standing issue, particularly between Western European developed countries and Eastern or Southeastern European developing countries. One factor contributing to this gap is the inefficient use of resources, including the low recycling rates of PET bottles in developing nations. Many of these countries face challenges such as insufficient recycling infrastructure, limited financial and technical capacity, low public awareness, and reliance on exporting plastic waste rather than processing it domestically.

1-2 Significance

PET bottle waste is a global environmental problem, but improving recycling systems in developing European countries could bring additional benefits beyond environmental protection. Increasing recycling rates can promote more efficient resource use, create jobs, strengthen local industry, and contribute to narrowing economic disparities across Europe. By examining successful models such as deposit return systems in developed countries, this research aims to explore practical solutions that could be transferred to developing contexts.

1-3 Purpose

The purpose of this study is to identify effective strategies for increasing PET bottle recycling rates in European developing countries. Specifically, the research aims to analyze whether deposit return systems—already proven successful in countries like Sweden and Germany—can be adapted and implemented in developing nations, and to clarify the conditions, challenges, and potential impacts of such implementation.

1-1. Social Context (Current Situation and Problems)

In many developing countries within Europe, the recycling rate of PET bottles remains significantly lower than that of more economically advanced nations. Although awareness of environmental issues is gradually increasing, inadequate waste-management infrastructure and limited government capacity still hinder efficient recycling practices. In addition, economic inequality affects people's daily decisions: for many low-income households, recycling is not seen as a priority because it provides no immediate financial benefit.

Without an effective incentive mechanism, large amounts of PET bottles end up in landfills or the natural environment, contributing to pollution and the inefficient use of valuable resources. These challenges demonstrate the need for a system that motivates citizens to return used bottles while supporting local governments in improving collection efficiency. Therefore, understanding the social and economic barriers in these regions is essential for proposing sustainable recycling solutions such as deposit systems.

1-2. Previous Research

Previous studies on recycling systems in Europe have extensively examined the effectiveness of deposit return schemes (DRS) in improving PET bottle collection rates. Research in countries such as Germany, Sweden, and Norway has shown that DRS can significantly increase recycling efficiency, reduce litter, and promote a circular economy. Many scholars highlight that financial incentives encourage citizens to participate more

actively in recycling, making DRS one of the most successful waste-management strategies in highly developed regions.

However, less attention has been given to developing countries within Europe, where economic inequality, insufficient infrastructure, and limited governmental capacity create unique challenges. Some researchers note that simply introducing a deposit system does not guarantee success if social and economic barriers are not addressed. For example, high initial installation costs, lack of public awareness, and regional disparities often prevent these systems from functioning effectively.

Despite these findings, there is still a gap in research regarding how deposit systems can be adapted to countries with lower income levels and weaker recycling networks. Few studies propose concrete strategies for tailoring DRS to these contexts. This gap leads directly to the purpose of the present study: to explore how deposit return systems can be realistically implemented in developing European countries and how such systems can contribute to reducing resource waste and improving recycling rates.

1-3. Research Question (RQ)

RQ: How can deposit return systems (DRS) be effectively introduced and adapted to developing countries within Europe in order to increase PET bottle recycling rates and reduce resource waste?

This question arises from the persistent gap between advanced European countries with high recycling rates and developing regions where PET bottle collection remains limited. While countries such as Germany and Sweden achieve recycling rates of over 80–90% through well-established DRS, several developing European nations still struggle with rates below 40%, mainly due to economic constraints, insufficient public awareness, and weak waste-management infrastructure.

Understanding how DRS can be modified to fit these social and economic conditions is essential for improving environmental outcomes and reducing inequality in resource management. By addressing this research question, the study aims to provide practical insights that go beyond simply copying successful systems from high-income countries and instead develop strategies tailored to local needs.

1-4. Hypothesis

I hypothesize that **a deposit return system (DRS) can significantly increase PET bottle recycling rates in developing European countries *only if* it is adapted to local economic conditions and supported by low-cost, accessible infrastructure.** In other words,

a modified DRS—one that reduces initial installation costs, provides meaningful financial incentives for low-income households, and includes strong public-awareness campaigns—is more likely to succeed than simply importing models from high-income countries.

This hypothesis is based on previous research showing that traditional DRS models function effectively in countries with stable economies, high public awareness, and well-developed recycling networks. Studies from Germany, Sweden, and Norway indicate that high deposit values and dense reverse-vending machine networks lead to recycling rates exceeding 85–90%. However, in developing regions, researchers have noted that similar systems often fail due to infrastructure gaps, limited government budgets, and insufficient citizen participation.

Therefore, this study proposes that **a context-specific DRS—featuring lower-cost collection methods, flexible deposit values, and community-based return points—will be more effective** in increasing recycling rates and reducing PET bottle waste. This hypothesis serves as a provisional answer to the research question and guides the investigation toward identifying practical and economically realistic solutions.

2. Research Method

This study employed a **comparative analysis** approach combined with a **policy evaluation framework** to examine how deposit return systems (DRS) can be adapted to developing European countries. The research process consisted of three main stages.

First, I conducted a systematic review of official reports, policy documents, and statistical data published by the European Environment Agency (EEA), Eurostat, and national waste-management authorities. These sources were used to compare PET bottle recycling rates, existing waste-collection infrastructure, and economic conditions across both high-income and developing European countries.

Second, I performed a **cross-case comparison** of countries with successful DRS models—such as Germany, Sweden, and Lithuania—and countries where recycling rates remain relatively low. By examining factors including deposit value, accessibility of return points, installation costs, and public-awareness strategies, I evaluated which elements of DRS contribute most to improved recycling outcomes.

Third, I analyzed the applicability of these factors to developing European countries by assessing economic feasibility and social acceptability. This involved reviewing government budget data, cost estimates of reverse-vending machine networks, and survey data on public willingness to participate in recycling programs. Through this process, I tested the hypothesis that a modified, lower-cost DRS could be more effective than simply implementing the high-cost models used in advanced countries.

Overall, the research method integrates quantitative data comparison with qualitative policy analysis in order to evaluate the conditions under which DRS can be successfully introduced in developing European regions.

3. Results and Discussion

3-1 Results

The comparative analysis of recycling systems revealed several key findings. First, countries with established deposit return systems (DRS), such as Germany, Sweden, and Norway, consistently show PET bottle recycling rates above 85%. These countries also maintain dense networks of return points and typically set deposit values between €0.10 and €0.25.

Second, in developing European countries, PET bottle recycling rates remain significantly lower, often between 20% and 40%. These regions generally have fewer return points, limited waste-management budgets, and lower levels of public participation in recycling activities.

Third, the cross-case comparison showed that installation costs for reverse-vending machines (RVMs) are a major barrier for lower-income countries. High-income countries operate thousands of RVMs nationwide, while developing countries rely more on manual collection centers due to cost constraints.

Fourth, data from government reports and surveys indicated that citizens in developing countries are more likely to participate in recycling programs when return points are located within walking distance and when deposit values provide noticeable financial benefit.

Finally, policy documents from countries that recently introduced DRS—such as Lithuania—show that simplified or lower-cost models, including manual return points, can still produce rapid increases in recycling rates.

3-2 Discussion

The results indicate a clear gap between high-income European countries with well-established DRS and developing countries where recycling rates remain low. High-income countries achieve recycling rates above 85%, supported by dense return networks and adequate financial resources, while developing countries struggle due to limited infrastructure and lower public participation. These findings directly relate to the research question by showing that the challenges in developing regions are not simply a lack of DRS, but structural and economic barriers that prevent effective implementation.

The results also demonstrate that installation costs for reverse-vending machines are a major obstacle. This supports the hypothesis that introducing a traditional, high-cost DRS model is unlikely to succeed in developing countries. Instead, the success of countries like Lithuania—where simplified and lower-cost return systems have produced rapid improvements—suggests that adapting DRS to local conditions is not only necessary but also feasible. This reinforces the idea that flexibility in system design, such as using manual return points or community-based collection centers, can make DRS more accessible and effective in lower-income settings.

Furthermore, survey and policy data showing that citizens are more willing to participate when return points are nearby and deposit values are meaningful highlight the importance of designing economically motivating systems. This connects to the hypothesis by confirming that financial incentives must be adjusted to match local income levels in order to encourage participation.

Overall, the discussion suggests that a "one-size-fits-all" approach to DRS is not effective. The results support the initial hypothesis that a modified, context-specific system—rather than a direct copy of high-income models—is more likely to increase PET bottle recycling rates in developing European countries. These findings contribute to a better understanding of how environmental policy can be adapted to reduce resource waste and address regional inequalities.

4. Conclusion and Future Prospects

This study examined how deposit return systems (DRS) can be effectively introduced and adapted to developing European countries in order to raise PET bottle recycling rates. The research findings show that while DRS is highly successful in high-income countries, a direct transfer of these systems is not feasible for developing regions due to limited financial resources, insufficient infrastructure, and lower public awareness. Therefore, the central research question can be answered as follows: **DRS can succeed in developing European countries only when it is redesigned to match local economic**

conditions, supported by low-cost collection methods, and combined with incentive structures that reflect citizens' daily needs.

One important implication of this study is the role of *cost-efficient incentive systems*. In many developing regions, the use of mobile money and digital payment platforms has grown rapidly in recent years. Data from financial-access studies show that digital transactions are more accessible than bank accounts or cash for many low-income households. Based on this context, the introduction of a DRS that returns *points, digital credits, or mobile-payment rewards* rather than cash may reduce operational costs while increasing participation. Such a

system could also integrate easily into existing shopping apps or transportation cards, making recycling both convenient and economically meaningful.

The social significance of these findings lies in the potential to reduce resource waste, lower environmental pollution, and decrease inequality in waste-management access across Europe. A context-specific DRS not only enhances recycling rates but also supports sustainable development by adapting environmental policy to the realities of economically disadvantaged communities.

For future prospects, my next step will be to explore specific incentive models—such as point-based systems, mobile-payment refunds, or community reward programs—and evaluate their effectiveness through case studies or small-scale simulations. Researchers and policymakers should continue investigating low-cost technologies and community-centered approaches that can support DRS in regions with limited budgets. Collaboration between local governments, private recycling companies, and digital-payment providers will also be essential for designing realistic and scalable systems.

By integrating technological innovation with economic feasibility, future DRS models have the potential to create more inclusive and effective recycling systems for developing European countries.

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5406 Kajizuka Takumi

Toward a Solution to the Immigration Issue

Immigration for the Benefit of the Host Nation

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【Toward a Solution to the Immigration Issue】

5406 Kajizuka Takumi

Abstract

This study examines the current situation and challenges of immigration in developed countries and explores policy measures that could ensure tangible benefits for the citizens of host nations. As of the end of 2024, the number of foreign residents in Japan reached 3,768,977, marking a 10.5% increase from the previous year and accounting for approximately 3% of the total population. While the rapid increase in foreign labor is regarded as a response to labor shortages, concerns have been raised regarding economic disparities and the impact on domestic workers. According to economist George J. Borjas, the economic surplus generated by immigration amounts to merely 6 billion USD annually, and even in the most optimistic estimate, it does not exceed 20 billion USD. Moreover, in skill groups where the labor supply increases by 10 percent, the wages of domestic workers may decline by up to 3.7 percent. Based on these findings, the study proposes that immigration should be limited to workers holding specific skills and that their occupations should be designated exclusively in sectors facing serious labor shortages. Furthermore, transparent disclosure of the potential impact of immigration to citizens is essential. Such an approach enables both economic gains and protection of domestic labor markets.

1. Introduction

1-1. Social Contex

According to the International Organization for Migration (IOM), the global number of international migrants reached 281 million in mid-2020, representing approximately 3.6% of the world's population. This figure has tripled since 1970, when the estimated number was 84 million. Immigration involves not only economic effects but also various challenges such as cultural frictions, differences in language and religion, fiscal burdens, and declining wages for domestic workers. In Europe, issues such as deteriorating public security and declining social cohesion have already surfaced, causing heightened social tensions.

In Japan, the number of foreign workers has risen due to labor shortages caused by population decline and aging. Although the Technical Intern Training Program and Specified Skilled Worker Program have contributed to securing labor in caregiving, construction, and agriculture, two major concerns remain. The first is the labor mismatch: an influx of low-skilled foreign workers may intensify wage competition among domestic workers with similar skill levels. The second is the issue of human rights violations. Under the current training system, restrictions on job mobility, low wages, and poor working conditions have frequently been reported. In this context, it is urgent to establish an immigration policy that is both economically rational and socially responsible.

1-2. Previous Research

Douglas Murray's "The Strange Death of Europe: Immigration, Identity, Islam (2017)" emphasizes that immigration without regulation produces limited economic benefits and that the skill level of immigrants significantly affects economic outcomes. Similarly, George J. Borjas (1995) demonstrates that the economic gains from immigration are extremely limited and that groups with high immigration inflows experience declining relative wages. These findings suggest the necessity of constructing a labor-market management framework that ensures tangible advantages for the host society.

1-3. Research Question

The research question of this study is: "How can immigration be directed to work in favor of the citizens of the host country?"

1-4. Hypothesis

This study hypothesizes that the host country can maximize economic benefits by restricting immigrant workers to designated sectors facing chronic labor shortages and by introducing a system that allows limited job transfers. In addition, accepting only immigrants with certain skills and ensuring the public

disclosure of immigration's potential impact would contribute to both economic efficiency and protection of domestic workers.

2. Research Method

This study adopts literature review and case analysis to examine the implications of continuing current policies and to test the validity of the hypothesis. Comparative examination was conducted on European immigration policies and Japan's Technical Intern Training Program, focusing on their impact on labor markets, the relationship between skill levels and economic outcomes, structural issues, and the potential integration of humanitarian considerations. Research by Borjas (1995) and Lewis (2004, 2005) served as primary references for analyzing the economic and wage effects of immigration.

3. Results and Discussion

If current policies are sustained, the continued influx of low-skilled immigrants is likely to depress the wages of domestic workers, consistent with Borjas's analysis. Concerns also remain regarding the deterioration of public security and cultural frictions that may accompany the long-term settlement of immigrants. On the other hand, limiting occupations to sectors facing labor shortages was shown to improve labor allocation and reduce recruitment costs, particularly in caregiving and construction. However, an excessive reliance on cheap labor may delay technological innovation and hinder productivity improvements.

While skilled immigration can increase tax revenue and productivity, its overall impact remains limited. The estimation that a 10 percent increase in the supply of a skill group results in a wage decline of up to 3.7 percent among domestic workers indicates that immigration has substantial labor market implications. Therefore, economic gains alone cannot justify uncontrolled immigration. Transparency regarding potential disadvantages is critical for securing public understanding and long-term policy legitimacy.

4. Conclusion

This study concludes that immigration can be channeled to benefit host-country citizens by designating specific occupations in labor-shortage sectors, allowing limited job mobility, restricting acceptance to skilled workers, and disclosing the potential impact of immigration to the public. Such a policy framework would protect domestic workers' wages, maintain equitable labor market conditions, and make economic benefits more sustainable. Regarding humanitarian concerns and refugee applications, stricter entry screening, time-limited public labor agreements, and guaranteed domestic minimum labor standards can offer a balanced approach. Immigration should not be treated solely as an economic instrument; rather, a data-driven and carefully designed system is indispensable for long-term social stability.

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To effectively utilize game-based learning

~Use in the military and medical field~

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Abstract
Game-based learning offers numerous benefits, but concerns about its recent emergence have made it difficult to introduce in school education and other settings. However, examining its application in the military field revealed that disadvantages, such as costs associated with implementation, are relatively minor. Furthermore, the use of game-based learning in the medical field is advancing, with particular attention being paid to its application for patient treatment. This demonstrates the usefulness of game-based learning, and I believe that making it easier to implement could accelerate its widespread adoption.

1. Introduction (Background, Significance, and Purpose)

In recent years, there has been a trend of utilizing games for educational purposes, known as game-based learning. Its application is being considered across various fields, including school education, medical settings, and the military sector. This research aims to make game-based learning accessible in more scenarios than currently possible and to make it mainstream.

1-1. Social Context (Current Situation and Problems)

Currently, game-based learning is not common.There are several reasons for this. One is the high cost of implementing game-based education. Introducing game-based education requires devices for playing games. Another reason is the lack of awareness about game-based education. There are few concrete success stories from implementing it. Furthermore, there are few cases where game-based education is specifically necessary.

1-2. Previous Research

Research on game-based learning has increased in recent years. However, studies on specific methods for utilizing game-based learning and examples of its implementation remain scarce. Previous research has largely focused on examining how games can be used in education or discussing their advantages and disadvantages, with few experiments conducted. Consequently, there is limited evidence demonstrating the actual outcomes resulting from the implementation of game-based learning.

1-3. Research Question (RQ)

The research question for this study is “What needs to be done to promote game-based education in the military and medical fields?”.Game-based learning is difficult to effectively implement across all fields. Introducing game-based learning comes with several drawbacks. These include significant costs and uncertainty stemming from a lack of precedents.The military and medical fields are considered areas where these challenges can be addressed and game-based education can be effectively utilized. Both are high-cost sectors. Furthermore, simulation—a key feature of game-based learning—can be effectively applied.Therefore, it is advisable to explore implementation methods within these fields.

1-4. Hypothesis

When introducing game-based learning, cost becomes an issue. However, in these fields,

utilizing games can help reduce costs. Therefore, we concluded it is necessary to demonstrate the effectiveness of game-based learning and lower the barriers to its adoption.In the military field, I thought experiments could be conducted in countries with strong military capabilities. Next, regarding the medical field. There are two ways to utilize game-based learning in the medical field: patient treatment and healthcare professional education.Previous research on patient treatment has already demonstrated proven effectiveness or existing implementation. Therefore, we concluded it is necessary to focus on healthcare professional training.

2. Research Method

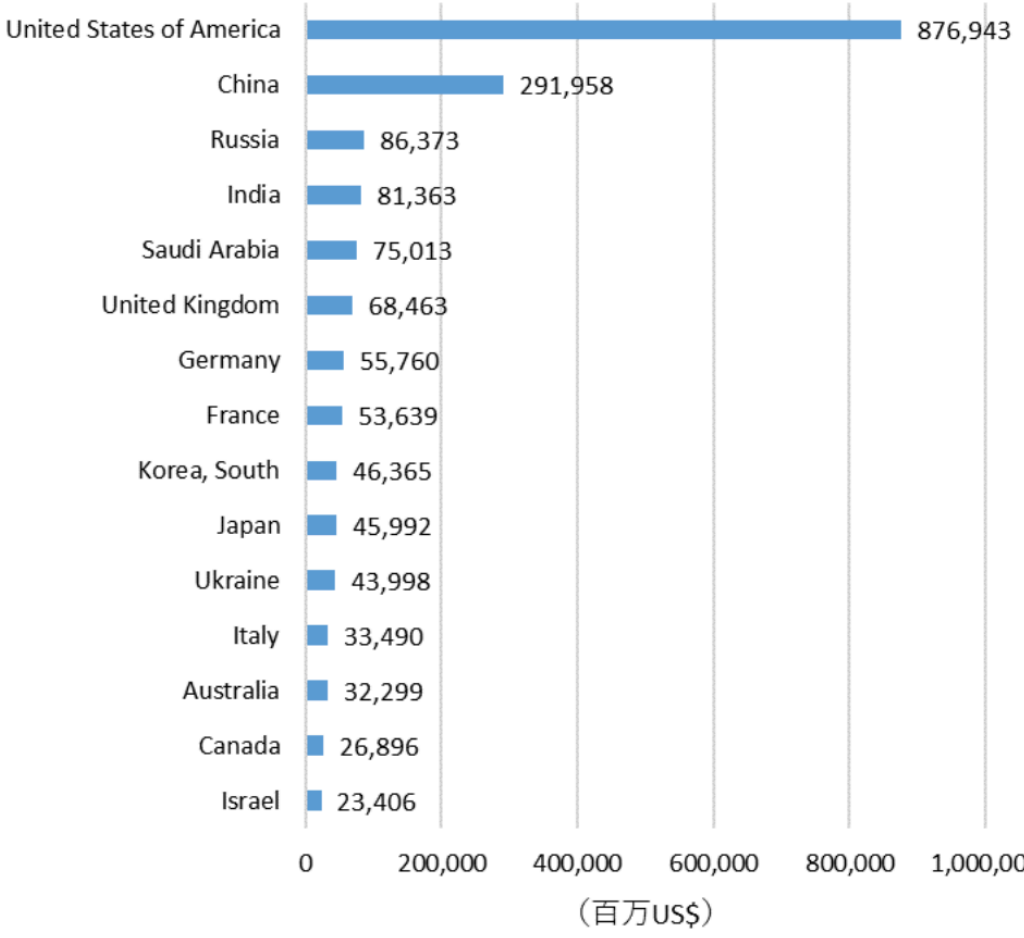
Information gathering was conducted on the following three points. First, the status of game-based learning in the military field. Second, the current state of game-based learning in healthcare worldwide. Third, the specific content of games used. Using the internet, information and precedents from various countries regarding these points were researched.

3. Results and Discussion

3-1 Results

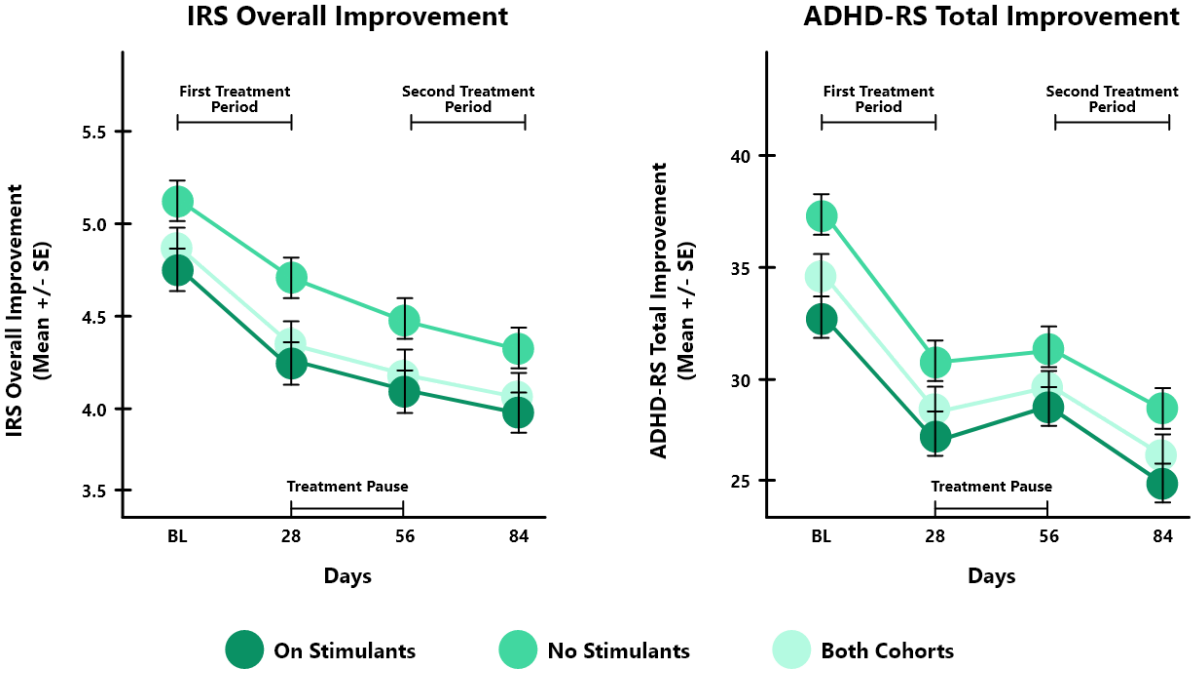
First, in the military field, it became clear that there are significant differences in the current state between countries. In developed nations such as the United States and Europe, implementation has progressed to a certain extent. Thus, in developed countries, the

資料 1　軍事費ランキング上位 15 か国（2022 年）



（出所）SIPRI Military Expenditure Database 2023（2023 年 4 月 23 日公表）より第一生命経済研究所作成

introduction of game-based education is beginning to advance.Moreover, among these nations, the United States and China were significantly advanced militarily.Games actually used in the military field include Virtual Battlespace and America's Army. Other titles were limited in purpose or restricted to specific countries, and their scale was smaller.Next is the medical field. First, the use of games for treating patients is not yet commonplace. However, there are many examples demonstrating effectiveness. For instance, there is a game called EndeavorRx designed to treat ADHD patients. There is also a game called Re-Mission aimed at treating cancer patients. This game is designed to enhance cancer patients' awareness and commitment to their treatment. While some have been evaluated, others have not yet proven their effectiveness.These developments are progressing in the United States, Europe, and Australia.Next, the use of games in medical education. Research and development are progressing, but while there are examples of implementation in educational settings, their use remains limited.Games like SimWars and 3DiTeams are used in some universities.



3-2 Discussion

The widespread adoption of game-based learning faces several challenges. One is proving exactly what types of learning games are effective for. This would lower the barrier to introducing games into education. Achieving this requires numerous experimental examples. In recent years, both the medical and military fields have increasingly been trialing game-based learning. This suggests time will resolve this issue. Another problem is the significant cost associated with implementing game-based learning. Introducing dedicated VR equipment and specialized software requires significant environmental preparation. Solving this issue necessitates establishing a framework to advance the development of games and hardware. This would enable lower-cost implementation and potentially optimize the games themselves.

4. Conclusion and Future Prospects

Through my research, I concluded that introducing game-based education requires further development in this area. Since game-based education has only recently gained prominence, there are few implementation examples or prior studies. Therefore, I believe it is best to gradually lower the barriers to adoption over time to promote its spread. Future research should consider two key areas. First, which countries and companies should specifically advance game research. Second, the regions where game-based learning should be introduced. If games become commonly used in these fields, effective applications will likely be discovered in other domains as well.

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Utilizing mRNA Vaccines for Cancer Treatment

~Establishing the Cold Chain~

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1. Introduction (Research Background, Significance, and Purpose)

1-1 Social Trends (Current Situation and Issues)

In recent years, mRNA vaccines have garnered significant attention and achieved remarkable progress in COVID-19 vaccine research. It was Dr. Calico, who won the 2023 Nobel Prize in Physiology or Medicine, who analyzed their performance during the pandemic and demonstrated they offer advantages comparable to other vaccines. This discovery enabled the successful development of a vaccine against COVID-19 in a country where even widespread cleaning efforts had failed to contain the virus. I began this research considering whether its unique characteristics could be utilized as a new medical technology for treatments targeting other path

1-2 Prior Research 1

This study utilized research conducted in the United Kingdom of Great Britain and Northern Ireland as prior research. In the UK, the use of mRNA vaccines for treating malignant neoplasms, commonly known as cancer, is currently being researched. In a relatively recent clinical trial, over half of pancreatic cancer patients treated with the vaccine experienced a significant delay in cancer recurrence. While conventional cancer treatments offer a wide range of options, all carry a high risk of early recurrence and a mortality rate exceeding 80%. This effect is therefore considered revolutionary, and the technology is expected to play a significant role as a new medical advancement.

1-3 Research Questions

However, mRNA vaccines face logistical challenges, specifically the inability to rapidly deliver them to all developed nations, where many cancer patients reside. These logistical issues fall into two main categories. One is the transportation method to countries lacking a cold chain infrastructure. mRNA vaccines require ultra-low temperatures during transport, making the establishment of transport routes capable of maintaining these low temperatures—the so-called cold chain—a key challenge. The other challenge is ensuring equitable distribution. Given the current global situation, where multiple conflicts exist—such as between Gaza and Israel, and Ukraine and Russia—it is anticipated that delivering vaccines fairly to both sides will be difficult. Based on these two challenges, this study formulates the following research question:

How can mRNA vaccines be rapidly delivered to all developed and emerging countries?

1-4 Hypothesis

Could this be resolved by creating and supporting an international agreement to promote cold chain infrastructure development, thereby accelerating vaccination uptake?

2. Research Methodology

Utilize social networking services to conduct research based on data from public institutions and private companies with extremely high reliability. Additionally, gather information from academic papers and books as necessary.

3. Research Findings and Analysis

1. The Basic Mechanism of mRNA Vaccines, the Subject of This Study

Human cells inherently contain a mechanism called ribosomes that produce proteins. mRNA vaccines utilize this mechanism to generate inactivated pathogens, enabling the immune system to eliminate them through acquired immunity. Until a few years ago, artificially replicating this process was technically challenging, and it was estimated to take at least five years before such vaccines could be used. However, accelerated research during the COVID-19 pandemic enabled mRNA vaccines to become cutting-edge medical technology in just four years—achieved through a two-year development period followed by two years of use during the pandemic. Furthermore, clinical trials for personalized mRNA vaccines have been conducted in the UK, targeting “neoantigens” (cancer-derived antigens) instead of pathogens. Due to their extreme precision compared to other vaccines, mRNA vaccines absolutely require cold chain transportation.

2. Cold Chain Infrastructure

We investigated the progression of cold chain infrastructure rates necessary for low-temperature transport and the efforts of private companies in various countries toward this infrastructure. We aimed to identify companies whose cooperation could help advance further infrastructure development by addressing challenges. Regionally, North America has the highest cold chain penetration rate, while Asia and Africa remain at low levels. This is largely attributed to higher average temperatures and developing-country status. However, Asia holds significant potential demand for frozen foods, suggesting its cold chain coverage rate will likely improve significantly in the future. Furthermore, in Africa, current research indicates that cancer incidence rates in inland areas are significantly lower than in other regions. Only two countries, Nigeria and South Africa, have incidence rates exceeding 0.5%. Considering only the cold chain coverage rates in these two countries, establishing a United Nations agreement appears to be a viable solution. Furthermore, since the temperature range for managing mRNA vaccines falls within the “refrigerated” category (3°C to 10°C) of the cold chain, collaborating with private companies that transport food within the same refrigerated category is expected to significantly improve the cold chain infrastructure rate for mRNA vaccines. Furthermore, the content of an international agreement could primarily involve cooperation among nations, centered on the

United Nations and especially the WHO, to create a mechanism for delivering mRNA vaccines equitably to all developing and developed countries.

4. Conclusion and Future Prospects

This paper proposes two measures to advance the application of mRNA vaccines in cancer treatment by establishing a cold chain.

First, conclude an international agreement centered on the United Nations, particularly the WHO, to support the development of vaccine transport routes and cold chain infrastructure in each country.

This will enable the equitable transport of vaccines to all developed and emerging nations, regardless of international conflicts.

and prevent humanitarian crises caused by lack of access to medical technology.

The second proposal is to request cooperation with private companies engaged in international food transportation for cold chain development.

This aims to accelerate the establishment of cold chains for mRNA vaccines.

By collaborating with private companies, countries can also create benefits for these companies,

which is expected to indirectly promote the logistics of other food products as well.

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mRNAワクチンで膵臓がんを治す！｜公益財団法人 東京都医学総合研究所 From October 13, 2024

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Konoike Transportコールドチェーンとは？温度帯や物流プロセス｜*KONOIKE*ジャーナル

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コールドチェーン機器市場規模、シェア、成長レポート、2030年From October 31,2025

Music culture around the world

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Abstract

This study examined the factors contributing to the global expansion of Japanese music culture—particularly Vocaloid culture—and explored practical methods to further enhance its international influence.

The research question posed was: What is required for activities promoting music culture to gain global impact and attract broader audiences?

The methodology involved multiple approaches, including hosting large-scale gaming tournaments, collaborating on music production, founding a community organization, completing corporate creative projects, and directing live events.

The findings indicate that the accumulation of experience and the expansion of community networks play a decisive role in establishing international cultural influence.

Furthermore, it is concluded that future efforts should focus on developing online knowledge-sharing systems and leveraging participation in official events to integrate diverse perspectives, thereby strengthening the global presence of Japanese music culture.

1. Introduction (Background, Significance, and Purpose)

In the past two years, my research has focused on the rapidly expanding internet-based music industry in Japan, with the aim of investigating how to encourage more people to engage with music. In the first year, I concluded that building communities that deepen interaction between creators and users is essential.

Last year, based on these findings, I explored whether large-scale cultural exchange through music could be achieved by utilizing the internet as a global platform. To develop this idea, I conducted research involving both marketing and community development. Specifically, I organized unofficial gaming tournaments, managed a large-scale music submission festival on NicoNico Douga, and worked to attract new audiences by collaborating with well-known TikTok influencers.

This year, reflecting on the challenges identified in previous studies, I placed greater emphasis on community activation. By expanding the scale of activities, my aim was to increase the overall impact of these efforts, and I carried out a series of practical, implementation-based research projects.

1-1. Social Context (Current Situation and Problems)

In Japan today, tourism revenue is the second largest among all industrial sectors, following the automotive industry. Within this, Japan's content industries—such as anime and music—serve as major drivers attracting visitors from abroad. For example, according to the "Where Are You From?" map displayed at Magical Mirai 2025, an exhibition accompanying the Hatsune Miku concert event, attendees came not only from across Japan but also from various regions around the world, including the United States and Europe.

This indicates that events related to Japanese content, not limited to Hatsune Miku, have a

significant influence internationally. Among these, I focused on music—particularly Vocaloid, which originated in Japan and has gained popularity worldwide. I chose this theme because I believe that by engaging in activities across diverse fields, even an individual's efforts can potentially expand their impact to a global scale.

1-2. Previous Research

According to the paper "Why Is Hatsune Miku Attracting Attention?", data indicate that the spread of Vocaloid has led to an increase in the number of people expressing their emotions through music. This trend can be explained by the fact that individuals who previously faced difficulties in creating music are now able to actively share their work by utilizing the internet.
Furthermore, two major factors have contributed to the rapid development of Vocaloid: the "character" and the video-sharing platform Nico Nico Douga. Regarding the character aspect, the licensing of Hatsune Miku has been organized in a way that allows anyone to legally and easily use her character, thereby lowering the barriers for individuals to participate in creative activities. In addition, Nico Nico Douga enables direct communication between creators and viewers, as comments and feedback appear in real time on uploaded music videos. This mechanism not only helps maintain creators' motivation and improve their skills, but also fosters a chain of creativity—through increased exposure, viewer feedback, and the production of derivative works by other users.

1-3. Research Question (RQ)

In my previous research up to last year, I examined what is necessary to make music culture feel more familiar to people around the world, and this allowed me to establish a general direction for further study. Building on these findings, the focus of this year's research advanced to the next stage. Specifically, I formulated the following research question: How can activities designed to make music culture more accessible be given global influence so that they attract interest from a wider international audience?

1-4. Hypothesis

From past research, it has become clear that utilizing the influence of the internet and approaching audiences from multiple directions can significantly enhance overall impact. However, I recognized that dramatically increasing my own visibility within a single year would be highly difficult. Therefore, I formulated the hypothesis that by leveraging the influence of well-known figures and planning and managing large-scale projects, it would be possible to attract public interest more effectively.

【論文タイトル】 5135 Terashiama-3

2. Research Method

In addition to continuing my previous activities, I carried out the following five new initiatives during this academic year:

1.Hosting a large-scale unofficial global tournament using the rhythm game Project Sekai: Colorful Stage! feat. Hatsune Miku
2.Collaborative music production with well-known composers and providing songs to prominent singers
3.Participating as a founding member, executive staff, and advisor for the esports event organization LightSheet
4.Producing the official website for the VTuber agency VividV and creating the opening teaser movie for their game tournament
5.Planning, managing, and producing stage direction for a fan-made virtual-singer live event

Detailed descriptions of each initiative are provided below.

1. Hosting a Global Unofficial Tournament Using “Project Sekai”

I have previously hosted several unofficial tournaments known as the Aoi Cup. This year, I organized Aoi Cup Final, the largest iteration to date. The operation involved recruiting participants via X (Twitter), preparing rules and regulations, selecting required songs, designing visual materials, producing the logo and opening video, establishing and configuring a Discord server, developing a scoring tool, commissioning illustrator “Amatsutsu!” for the key visual, and inviting VTuber Mei Kanon and streamers Mido and Fushoku as commentators.
The event was livestreamed on Discord for Day 1 and on YouTube for Day 2. Relevant links are listed in the References section.

2. Collaborative Music Production and Song Contributions

As a Vocaloid producer, I expanded my activities by collaborating with well-known creators. The songs I contributed to this year are as follows (Title / Composer / My Role):
Little Diver / Ponchi / Lyrics
Fairy Tale Angel Star / irucaice / Commissioned production, mastering (Theme song for the Aoi Cup)
Lavender / MIMI&saewool / Lyrics
Star / Daibakuhashin / Lyrics, bass melody (Included in a rhythm game)
Flower knot / Kuriyama Yuri / Lyrics, melody, arrangement (Included in a rhythm game)
Highlight/Yuu/Music production
Pengyou Festival Theme Song / Ponchi, irucaice, Niwashi / In progress

3. Establishment of the Esports Organization “LightSheet”

LightSheet is an event-production group aimed at revitalizing the unofficial tournament scene of music games, especially Project Sekai. After receiving an invitation from the representative, Ainurun-to, I joined as an executive member and advisor. My contributions included supporting the organization of the “Clan Battle -2025 Revival-” and conducting a

workshop titled “Behind the Scenes of Running a Successful Tournament.”

4. Website Development and Tournament Video Production for VividV

At the request of VTuber Mei Kanon, I served as a planner and operator for LinkUp Cup 2nd, a rhythm-game tournament hosted by the VTuber agency VividV. My responsibilities included producing the opening teaser movie, coordinating corporate VTubers, managing tournament operations, and designing announcement visuals. The event took place over two days at esport style Ueno.
Additionally, I developed the official website of VividV upon request from the company’s CEO.

5. Planning and Producing a Fan-Made Live Event “Miku Crossing”

For the fan-made virtual-singer live event Miku Crossing, held at Tokyo Big Sight on November 23, I created the setlist, produced background visual effects, and operated lighting on-site. I also researched and constructed the projection system that displays 3D characters on a transparent screen, and set up the necessary projector–PC connections.

3. Results and Discussion

3-1 Results（結果）

Across the various activities carried out in this study, substantial outcomes were observed regarding the expansion of interest in musical culture and the development of global influence. First, in the tournament project, we successfully attracted a large number of highly skilled participants, including not only Japanese players but also players residing in Korea, well-known streamers, and competitors with experience in world championships. Despite the absence of regular streaming content outside of the tournament, the YouTube livestream exceeded 500 concurrent viewers, and multiple foreign-language comments were observed in the chat, suggesting the presence of an international audience.

In music production, several of the original songs surpassed one million views on YouTube and even appeared in the “trending” section, demonstrating significant reach and online engagement. The total number of comments exceeded 1,000, indicating diverse feedback from listeners.

Regarding the LightSheet project, more than forty applicants responded to the recruitment announcement on X, and selected members are currently engaged in the execution of large-scale initiatives. Additionally, the weekly “LightSheet Cup,” held to provide broader access to competitive events, has accumulated over 200 participants, demonstrating the potential for sustainable community growth.

The VTuber project and live concert also achieved high levels of concurrent viewership and audience turnout. Notably, the live concert trended on X, and a follow-up event has already been scheduled. According to an audience survey, the majority of attendees were students or individuals in their twenties, and over 90% rated the fan-made live event as satisfactory. Some

users even posted evaluations stating that the quality was comparable to that of an official concert.

These findings indicate that multi-faceted online initiatives can effectively generate large-scale public interest and contribute to gaining international influence.

3-2 Discussion（考察）

The results of this study suggest that leveraging online environments for the dissemination of musical culture and the formation of communities significantly contributes to generating interest and expanding cultural influence at both domestic and international levels. The initiatives implemented—tournament organization, music production, and live event management—each reached distinct audience segments, demonstrating that a multifaceted approach produces synergistic and comprehensive outcomes.

The tournament project, which drew participants from multiple countries without targeted international promotion, indicates that online competitive culture easily transcends national boundaries. This finding highlights the importance of accessibility in online spaces, a principle equally relevant to the dissemination of musical culture.

In music production, the achievement of over one million views and appearance on the YouTube “trending” list shows that Vocaloid-centered digital music culture continues to possess strong viral potential. The large number of comments suggests that these works serve as platforms for emotional expression and communication, reaffirming the interactive nature of online musical activities.

The significant number of applicants for LightSheet and the sustained participation in weekly tournaments indicate that the project successfully functioned as an attractive community for users. The continuity of the activities contributed to the stable growth of the community, suggesting that long-term engagement structures are essential for cultural influence.

Furthermore, the successful VTuber project and live concert demonstrate the synergistic effect of combining online culture with real-time experiences. The high satisfaction rate—despite the event being fan-made—indicates that high-quality cultural experiences can be created through creativity and community collaboration, without relying on large-scale corporate production.

Overall, the findings of this study demonstrate that even individual creators can achieve global influence by integrating multiple online platforms and providing participatory cultural experiences. This suggests a potential new model for independent creators seeking to expand their impact internationally.

4. Conclusion and Future Prospects

Through the series of activities conducted in this study, it has become evident that the most crucial factor in driving large-scale projects and fostering cultural influence is the accumulation of individual experience. By engaging in tournament organization, music production, community management, and live-event direction, I was able not only to expand the scope of my activities but also to gradually develop the knowledge, technical skills, and networks required for carrying out complex projects. Moving forward, it will be important to

communicate the value of such experience to a wider audience and to continue creating environments—such as those provided by LightSheet—that lower the barriers for individuals wishing to engage in creative or organizational activities.

To further enhance the influence of the community, it is essential to broaden the visibility of platforms that allow people across national borders to access and share practical expertise. Therefore, one of the main objectives for the next stage of research will be to increase the recognition and reach of initiatives like LightSheet, which enable users to gain specialized knowledge through online collaboration.

Additionally, my upcoming participation in the Creators Market at the official “Magical Mirai 2026” exhibition marks a significant milestone, representing the culmination of five years of continuous study and musical creation. Direct interaction with fans at such a large-scale official event is expected to provide valuable insights and new perspectives as a creator.I plan to participate in that event along with Kuriyama Yuri, Guiano, Sekikomigohan, and Aoki Go. Moreover, my involvement in the Project Sekai Championship 2025 offered meaningful opportunities to experience the perspectives of professional players, further enriching my understanding of the broader music-game culture.

In the future, I aim to utilize the diverse experiences gained throughout this year to explore new approaches and contribute to the continued development and revitalization of music culture and its related industries.

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-Lavender / MIMI&saewool / Lyrics

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Special Thanks
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https://x.com/ponchi_pop?s=20
-irucaice
https://x.com/irucaice?s=20
-Kuriyama Yuri
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-Daibakuhashin
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-Fusyoku
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All Contestant
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Shiogohan/Pokky/Kabane/Bill/Gyogyo/Meet/Sanpunmattamen/Chichan/REN/Kan/Mitsuba/
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Euglena fuels for saving Earth

～To reduce carbon dioxide emissions through the use of Euglena-based biofuel～

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Abstract

Last year, I researched biofuel from Euglena and found that refining the fuel required the use of waste oil. Since waste oil may become unavailable in the future, I am considering producing fuel using only Euglena. Based on company websites and AI advice, I believe that cultivating Euglena using livestock wastewater is a promising approach. Livestock wastewater contains nutrients such as nitrogen and phosphorus, which are expected to promote the growth of Euglena. Moving forward, I plan to consider strategies for mitigating the risks associated with using livestock wastewater.

1. Introduction

Last year, I researched biofuel-related issues in Africa. Specifically, these issues include deforestation caused by biofuel production and rising grain prices. As a solution, I proposed Euglena-based biofuel.

This time, since conventional Euglena fuel contains a large amount of waste oil, I decided to try producing 100% Euglena-based fuel.

1-1. Social Context

Euglena has gained social attention for its potential use in nutrition, biofuels, and environmental sustainability. One key social issue is food security, as *Euglena* is considered an alternative food source that can be produced with limited land and resources. However, the high cost of large-scale production limits its accessibility, especially in developing regions.Another issue concerns commercialization and ethics. *Euglena*-based products are often sold as health supplements, but some health claims lack sufficient scientific evidence, raising concerns about consumer protection. In addition, although *Euglena* is regarded as environmentally friendly, large-scale cultivation requires careful regulation to ensure sustainable and equitable use.

1-2. Previous Research

Currently, the bio-venture company Euglena Co., Ltd. has developed and begun supplying a next-generation biodiesel fuel called SUSTEO made using Euglena. Since successfully establishing outdoor mass cultivation technology for food use in 2005, the company has developed a wide range of products using Euglena, including not only fuel but also cosmetics and food products.

However, challenges still remain. One major issue is that the fuel is not 100% Euglena-based, which is also the focus of my research. Currently, the main raw material is used cooking oil, and its supply is limited. Therefore, increasing the amount of oil produced through Euglena

cultivation has become an important task.

1-3. Research Question

What is needed to produce 100% Euglena Fuels?

To culture as many *Euglena* cells as possible, while aiming to produce a large quantity of high-quality biomass.

2. Research Method

I mainly researched two things

How Euglena grows

What factors help promote Euglena's growth

Through this research, I aim to explore methods for producing a large enough quantity of Euglena to enable the creation of 100% Euglena-based biofuel.

3. Results and Discussion

First of all, what is "Euglena-based biofuel"?

Euglena biofuel is a renewable energy fuel produced from the lipids (oils) that Euglena accumulates in its body through photosynthesis. As Euglena absorbs carbon dioxide (CO_2) during its growth process, the CO_2 emitted during combustion is offset, making it nearly carbon-neutral. In addition, since Euglena is a type of microalgae that does not compete with food crops, it is expected to be used as a next-generation aviation and diesel fuel.

I also found that the following three factors are important for cultivating Euglena:

① An environment with sufficient sunlight

Euglena performs photosynthesis, and with adequate sunlight, it can produce a large amount of nutrients within its body. These components accumulate like fat, and this fat is used as fuel.

② Warm temperature conditions
Euglena grows well in warm environments, with temperatures around 27–30°C considered optimal. In this temperature range, cell division becomes active, allowing efficient growth.

③ A nutrient-rich water environment
Euglena is a microalga, and it grows better in water containing organic matter because it provides abundant nutrients. However, extremely polluted or highly toxic water can hinder its growth.

Among these three factors, I focused on point (3).
Upon further research, I found that Euglena grows particularly well in water rich in phosphorus and nitrogen. I then investigated water sources containing high levels of these substances and discovered that they are abundant in livestock wastewater, mainly due to animal waste and leftover feed.

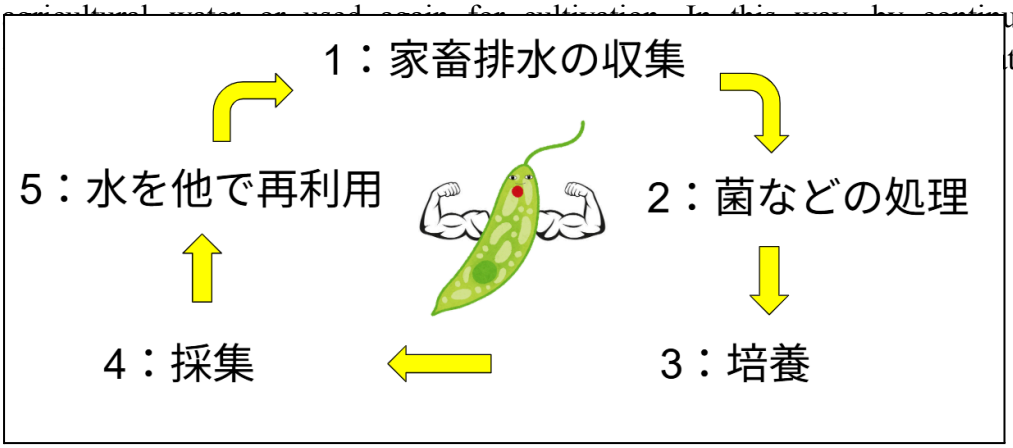
3-2 Discussion

I propose a “Euglena cultivation cycle using livestock wastewater.”

First, livestock wastewater rich in organic matter such as nitrogen and phosphorus is collected from farms. Next, as a pre-treatment step, large solids and harmful substances are removed, and the pH and temperature are adjusted as necessary to create a suitable environment for cultivation. After that, the treated wastewater is transferred to cultivation tanks or outdoor ponds, and Euglena is introduced. By conducting this process outdoors, the effects of photosynthesis can be expected. I also believe that this process may contribute to improving the water quality.

Once Euglena has sufficiently multiplied, it is harvested. The collected Euglena is then processed in the same way as before, extracting lipids to be used as biofuel. In addition to biofuel production, it may also be possible to use Euglena as a raw material for animal feed or food products.

Furthermore, the treated water, which has reduced nutrient content, can be reused as agricultural water or used again for cultivation. In this way, by continuously utilizing ting production



4. Conclusion and Future Prospects

In this research, many aspects still remain as ideals in my mind. When I reconsidered from the beginning, I came to think that producing 100% Euglena-based biofuel may be quite difficult to achieve. This is because the amount of oil that can be obtained from a single Euglena is extremely small, and even if Euglena are cultivated in large quantities, it is not guaranteed that oil can be extracted from all individuals. (I also think this may be one of the reasons behind the high cost of SUSTEO.) To produce fuel at 100%, it would be necessary to reliably extract a consistent amount of oil from an enormous quantity of Euglena, which makes stable production challenging.

I felt that many challenges still remain in order to achieve stable fuel production in the future.

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Modular Housing as a Catalyst for Social and Economic Integration of Displaced Populations

～Low-carbon modular housing as a platform for economic participation and long-term integration of displaced populations～

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Abstract
This study focuses on housing improvement as a key to promoting independence for displaced people.It proposes modular, low-cost shelters made with next-generation sustainable materials and explores how these can be integrated into urban and territorial planning.Based on case studies and international frameworks, the research aims to reduce costs and environmental impacts while supporting long-term social integration.

1. Introduction (Background, Significance, and Purpose)

Forced displacement is no longer a temporary or exceptional condition but an increasingly long-term and structural global challenge.

As conflicts, climate-related disasters, and political instability persist, millions of displaced people are living for extended periods in environments originally designed for short-term emergency response.

In this context, housing is not merely a matter of physical shelter but a critical foundation shaping social stability, economic participation, and future prospects for displaced populations.

This study focuses on internally displaced persons (IDPs) and examines how housing design can move beyond emergency response to support long-term self-reliance and integration-oriented outcomes.

1-1. Social Context (Current Situation and Problems)

Prolonged displacement has become a defining challenge of contemporary humanitarian and urban contexts.

According to international organizations, a significant proportion of displaced populations now live in situations of long-term displacement, often lasting for many years or even decades.

In such contexts, housing solutions originally designed for short-term emergencies increasingly function as de facto permanent living environments.

Internally displaced persons (IDPs) are particularly affected by this shift.

Unlike refugees, IDPs remain within their country of origin and therefore often face limitations in accessing international protection mechanisms.

As a result, many IDP settlements develop under constrained institutional and financial conditions, leading to inadequate housing quality, limited employment opportunities, and growing pressure on host communities.

1-2. Previous Research

Conventional humanitarian shelter responses tend to prioritize speed and cost efficiency, frequently relying on temporary structures that are difficult to adapt over time.

While such approaches are effective in immediate emergencies, they often fail to address the realities of long-term displacement, where housing stability, economic participation, and social integration become critical factors.

Recent research has increasingly emphasized the importance of integrating architectural design with broader social and economic considerations.

Studies in sustainable construction, low-carbon materials, and modular building systems suggest that housing can play a central role not only in improving living conditions but also in supporting long-term development outcomes.

At the same time, urban studies have begun to recognize displacement settlements as transitional urban spaces, requiring planning approaches that account for gradual integration rather than isolation.

1-3. Research Question (RQ)

Against this background, this study explores how housing design can function as a foundational environment enabling long-term social and economic participation for IDPs.

The main research question guiding this study is:

How can modular housing systems, combined with employment opportunities and urban integration strategies, create environments in which internally displaced persons can transition from displacement toward long-term social and economic participation?

1-4. Hypothesis

This study hypothesizes that housing stability functions as a critical enabling condition for economic participation and gradual urban integration in long-term displacement contexts.

To examine this hypothesis, the research adopts a three-axis analytical framework:

・The A-axis analyzes the technical and material conditions required for adaptable, semi-permanent modular housing.

・The B-axis investigates employment models and collaboration with private enterprises that enhance economic agency while reducing housing-related costs.

・The C-axis examines how housing stability and economic participation contribute to gradual functional integration with surrounding urban and regional systems.

Through this integrated approach, the study aims to contribute to discussions on humanitarian

housing, sustainable development, and urban planning by presenting a framework that responds to the long-term nature of displacement while remaining adaptable to diverse contexts.

2. Research Method

As shown in Figure 1, this study adopts a three-axis analytical framework integrating modular housing design, economic participation, and urban and regional integration.

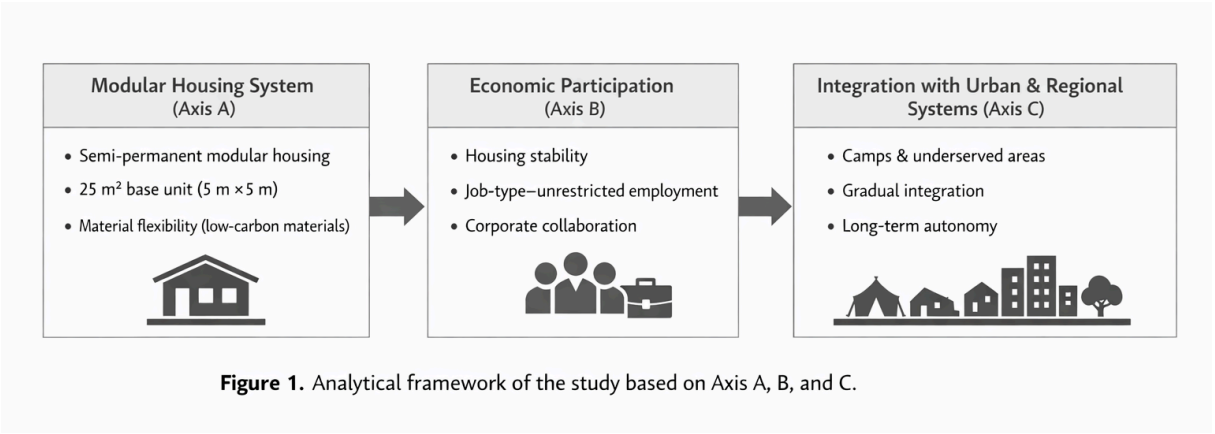


Figure 1. Analytical framework of the study based on Axis A, B, and C.

2.1 Analytical Framework

This research adopts a multi-layered analytical framework combining architectural, environmental, and socioeconomic perspectives. The framework is structured around three main axes: housing design and materials (Axis A), economic participation and employment (Axis B), and long-term integration with surrounding urban or regional systems (Axis C). This approach allows the study to evaluate housing not only as a physical structure but also as a foundation for social and economic stabilization of internally displaced persons (IDPs).

2.2 Evaluation of Housing Design and Materials

To evaluate the proposed modular housing system, this study draws on existing research on low-carbon and sustainable building materials. Materials such as cross-laminated timber (CLT), bamboo, compressed stabilized earth blocks (CSEB), straw-based composites, and emerging bio-materials are examined at an analytical level.

Rather than testing materials experimentally, the study assesses their suitability through comparative analysis based on durability, thermal performance, environmental impact, and adaptability to modular construction. Findings from architectural and environmental engineering literature are used as reference benchmarks for defining material requirements.

2.3 Environmental and Life-Cycle Assessment Methods

Environmental performance is examined using concepts derived from Life Cycle Assessment (LCA) and Life Cycle Costing (LCC). These methods are used to conceptually evaluate carbon emissions, resource use, and long-term cost efficiency across the housing life cycle, from material production to use and potential reuse.

Additionally, material flow considerations are incorporated to assess the reusability and scalability of modular components, drawing on principles from circular building research.

2.4 Climate-Responsive Performance Analysis

Thermal comfort and indoor environmental quality are evaluated based on climate-responsive design principles identified in prior architectural studies. This includes qualitative assessment of insulation strategies, ventilation potential, and wall thickness requirements suitable for different climatic conditions.

The analysis focuses on whether the proposed housing model can provide stable indoor environments that support health and daily activities, rather than relying on minimum emergency shelter standards.

2.5 Socioeconomic Impact Assessment

The socioeconomic implications of housing stability are analyzed using qualitative indicators drawn from previous studies on displacement and development. This includes examining how stable housing conditions may improve access to employment opportunities, education, and community participation.

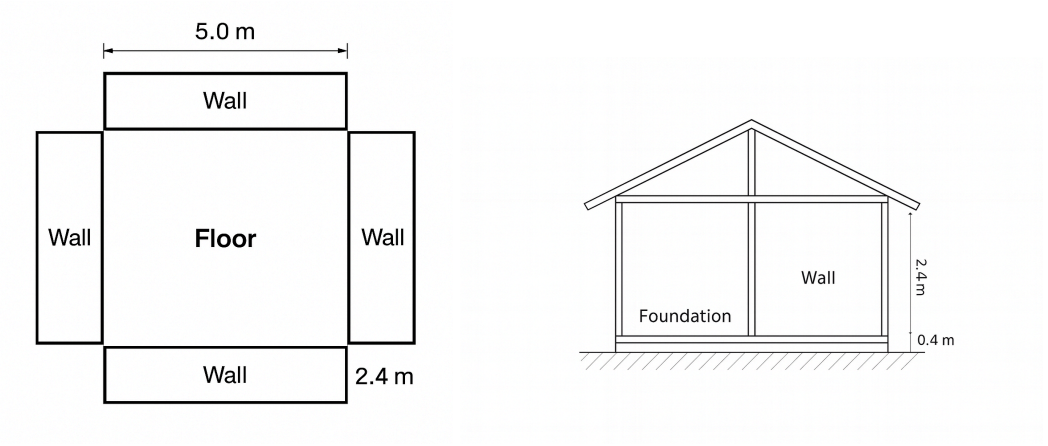
Rather than limiting economic participation to housing construction activities, this research considers housing stability as an enabling condition for broader forms of employment and long-term income generation.

2.6 Research Scope and Limitations

This study does not conduct on-site experiments or simulations but relies on secondary data and comparative analysis. The focus is on internally displaced persons (IDPs), including those living in established camps as well as those in underserved or hard-to-access regions. While specific regional examples are referenced, the proposed model is intended as a transferable framework rather than a location-specific solution.

3. Results and Discussion

Figure 2 presents the floor plan of the 25 m² base housing unit, illustrating the modular configuration that enables incremental expansion.



3-1 Results

3.1 Results of the Modular Housing Design and Material Strategy (Axis A)

This study proposes a semi-permanent modular housing model designed for internally displaced persons (IDPs) living both in established camp settings and in underserved or hard-to-access regions. The housing unit is based on a standardized floor module of 25 m² (5 m × 5 m), which functions as the minimum living unit for individuals or small households. Additional modules can be connected horizontally to accommodate larger family sizes or changing household needs.

Structurally, the housing system consists of a reinforced concrete foundation, modular floor panels, and detachable wall panels with a standard height of approximately 2.4 m. The foundation is designed with a wide footprint to ensure stability without requiring elevation, and critical areas are reinforced with steel where necessary. Wall and floor components are not permanently fixed; instead, they are externally fastened using mechanical connections that allow assembly and disassembly without reliance on electrical tools. Internal stabilization is achieved through cross-wire reinforcement at the corners of wall panels, applying conventional but simplified construction techniques.

In terms of material strategy, this research does not finalize a single construction material but instead defines performance-based material conditions. Drawing on existing literature, candidate materials include cross-laminated timber (CLT), bamboo, compressed stabilized earth blocks (CSEB), straw-based composites, hempcrete, and emerging bio-based materials such as mycelium-based insulation. These materials have been widely discussed in previous studies for their low embodied carbon, adequate structural performance, and potential for thermal comfort improvement.

Rather than prioritizing local material sourcing alone, the proposed model allows flexibility in material selection depending on logistical constraints. Core structural components—such as floor panels, wall panels, and primary supports—are assumed to be prepared or standardized

externally, while the system remains adaptable to different delivery conditions. This approach acknowledges that material transport and access vary significantly across displacement contexts and therefore requires adaptable rather than fixed assumptions.
Figure 3 summarizes the low-carbon material strategy of the proposed modular housing system, highlighting multiple material options based on environmental performance and circularity.

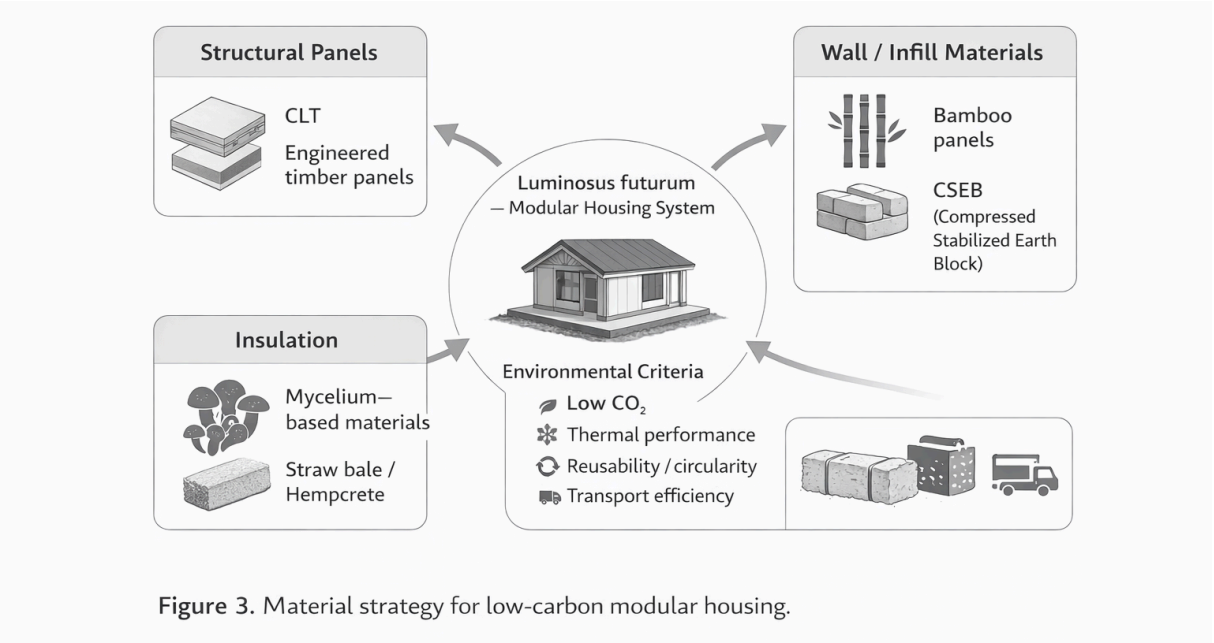


Figure 3. Material strategy for low-carbon modular housing.

From a performance perspective, the modular housing model demonstrates potential advantages over conventional emergency shelters. The use of thicker wall assemblies and insulated panels is expected to improve indoor thermal stability, supporting daily activities and long-term habitation. Importantly, the modular design allows for incremental upgrading, replacement of damaged components, and future material innovation without dismantling the entire structure.

Overall, the results of Axis A indicate that a modular, material-flexible housing system can function as a semi-permanent living environment rather than a temporary shelter. By prioritizing adaptability, durability, and environmental considerations, the proposed housing model establishes a stable physical foundation that supports subsequent economic participation and social integration.

3.2 Results of Housing Stability on Economic Participation (Axis B)
As illustrated in Figure 4, housing stability functions as a catalyst for economic participation by improving access to diverse employment opportunities without limiting occupational types.

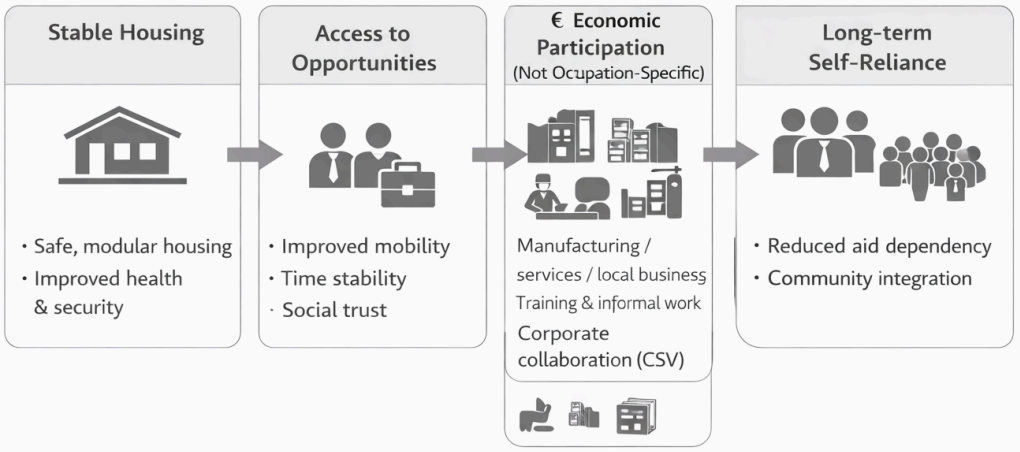


Figure 4. Housing Stability as a Catalyst for Economic Participation

Stable housing enables broader economic participation, leading to skills acquisition and long-term self-reliance for IDPs.

The results of this study suggest that stable housing plays a critical role in enabling economic participation among internally displaced persons (IDPs). Rather than viewing employment as a direct outcome of housing construction activities, this research positions housing stability as a foundational condition that increases access to diverse forms of work across multiple sectors.

Secure and adequate housing reduces daily uncertainty related to safety, health, and mobility, allowing residents to allocate time and resources toward income-generating activities. Previous studies indicate that unstable living conditions often limit job retention and skill development; in contrast, semi-permanent housing environments can support regular work schedules, skill acquisition, and long-term planning. In this model, housing functions as an enabling infrastructure that supports participation in employment without restricting opportunities to specific occupations.

Importantly, the proposed framework does not limit economic participation to construction-related labor. Instead, it emphasizes a job-type–unrestricted employment model, allowing IDPs to engage in a wide range of occupations, including services, small-scale manufacturing, education, digital work, and other locally or remotely accessible forms of employment. This flexibility is essential given the diverse skill sets and experiences present within displaced populations.

The results also highlight the potential role of private-sector involvement in supporting economic participation. Companies can contribute through employment pathways, skill development programs, and infrastructure support aligned with corporate social value creation (CSV) strategies. When combined with support from local governments and non-governmental organizations, such collaborations can reduce financial pressure on host communities while creating shared economic benefits.

Overall, the findings of Axis B indicate that housing stability should be understood not merely as a humanitarian objective but as a strategic investment in socioeconomic recovery. By enabling access to job opportunities without limiting occupational categories, the proposed housing model supports long-term income stability and reduces dependency on continuous external assistance.

3.3 Results of Urban and Regional Integration Potential (Axis C)

The proposed housing model demonstrates potential for integration with both urban and non-urban environments, addressing the diverse spatial contexts in which internally displaced persons (IDPs) reside. This includes established displacement camps, peri-urban areas surrounding cities, and regions where humanitarian assistance remains limited due to access constraints. Rather than assuming a single settlement pattern, the model is designed to function across multiple territorial conditions.

In urban and peri-urban contexts, the modular housing system allows gradual spatial integration with surrounding communities. Because the housing units are semi-permanent and incrementally expandable, they can transition from isolated settlements into neighborhoods that share infrastructure such as roads, utilities, and public services. This aligns with urban planning approaches advocated by international organizations, which emphasize inclusion of displaced populations within broader urban development frameworks rather than long-term segregation.

In non-urban or hard-to-access regions, the adaptability of the housing system enables deployment under varying logistical conditions. The separation of core structural components from replaceable or upgradable elements allows the model to respond flexibly to transportation limitations and material availability. As a result, the housing system can function as an initial stabilization measure while maintaining compatibility with future regional development or relocation strategies.

From a long-term perspective, the integration potential of the proposed model lies in its capacity to support social and economic continuity. Stable housing enables residents to establish routines, participate in local economies, and form social connections with host communities. Over time, this reduces the distinction between displacement settlements and surrounding urban or regional spaces, contributing to social cohesion rather than spatial isolation.

Overall, the results of Axis C suggest that housing designed with adaptability and longevity can serve as a bridge between humanitarian response and territorial development. By accommodating both urban integration and regional flexibility, the proposed model supports a pathway through which displaced populations can transition from temporary displacement toward more stable and inclusive living environments.

Figure 5 conceptualizes a gradual integration pathway from displacement settings to urban and regional systems as a long-term future outlook.

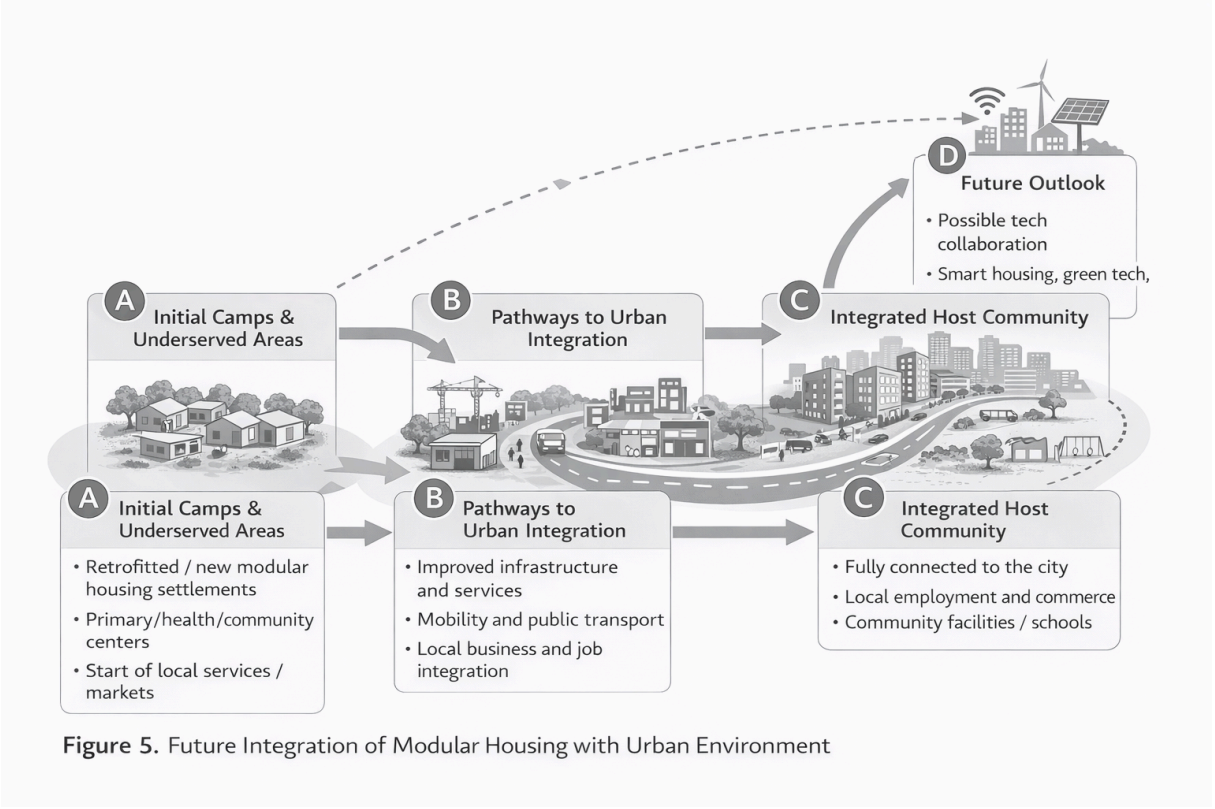


Figure 5. Future Integration of Modular Housing with Urban Environment

3-2 Discussion

3.4 Discussion: Comparison with Previous Studies

This section discusses how the proposed housing model compares with previous studies on humanitarian housing, modular construction, and displacement responses. Existing research has extensively examined emergency shelters, refugee camps, and modular housing systems; however, many studies focus either on short-term shelter provision or on material performance in isolation.

Compared to conventional emergency housing models discussed in humanitarian guidelines, the proposed system differs in its explicit assumption of long-term displacement. While many shelter designs prioritize rapid deployment and minimal cost, they often lack adaptability and durability. In contrast, this study aligns with recent critiques in the literature that argue for semi-permanent and incremental housing solutions capable of supporting extended habitation.

In relation to modular housing research, previous studies emphasize scalability and standardization but frequently rely on industrial materials and centralized production. The proposed model builds on these concepts while introducing a performance-based material strategy rather than a fixed material specification. This approach reflects findings from sustainability-focused research, which suggests that material flexibility and life-cycle considerations are critical for reducing environmental impact in diverse contexts.

Furthermore, urban-focused displacement studies advocate integrating displaced populations

into broader urban and regional planning frameworks. The results of this research are consistent with these perspectives, particularly those promoted by international organizations that emphasize inclusion of host communities and shared infrastructure. However, this study extends previous work by explicitly connecting housing stability with economic participation that is not limited to specific job types.

Overall, the proposed model complements existing research while addressing gaps related to long-term adaptability, material flexibility, and the role of housing as a foundation for socioeconomic stabilization. By synthesizing architectural, environmental, and socioeconomic perspectives, this research contributes a more integrated framework than those typically found in single-discipline studies.

3.5 Discussion: Limitations and Future Applicability

Despite the potential advantages identified in the proposed housing model, several limitations must be acknowledged. First, this research does not include on-site construction experiments or quantitative simulations. As a result, structural performance, thermal efficiency, and cost estimates are discussed at a conceptual level based on existing literature rather than empirical testing. Future studies should validate these assumptions through pilot projects or simulation-based evaluations.

Second, the final selection of construction materials remains open. While this study defines performance-based conditions for materials—such as low carbon impact, sufficient insulation, and modular compatibility—the feasibility of specific materials may vary depending on regional regulations, climate, and supply chains. This flexibility is intentional, but it also introduces uncertainty regarding standardization and large-scale implementation.

Third, socioeconomic outcomes related to employment and integration are assessed qualitatively. Although previous research supports the relationship between housing stability and economic participation, the extent of these effects may differ across cultural, political, and economic contexts. Factors such as labor market conditions, legal frameworks, and education systems could influence outcomes beyond the scope of this study.

In terms of future applicability, the proposed model is designed to function as a transferable framework rather than a location-specific solution. Advances in construction technology, low-carbon materials, and digital infrastructure may further enhance the feasibility of the model. In particular, collaboration with private-sector actors, including technology-oriented companies, could expand employment pathways and support long-term community development.

Overall, while the model has limitations inherent to conceptual research, it provides a structured foundation for future interdisciplinary studies and pilot implementations. By addressing housing as both physical infrastructure and a platform for social and economic stabilization, the proposed approach offers a viable direction for improving living conditions and long-term outcomes for internally displaced populations.

4. Conclusion and Future Prospects

This research examined how housing for internally displaced persons (IDPs) can be redefined from a temporary humanitarian response into a foundation for long-term stability and social integration. Focusing on displacement contexts where conventional assistance is limited, the study proposed a semi-permanent modular housing model that integrates architectural design, material strategy, and socioeconomic considerations.

Through Axis A, the research demonstrated that a modular housing system with a standardized floor unit and adaptable wall components can function as a durable and flexible living environment. By adopting a performance-based material strategy rather than a fixed material selection, the model accommodates diverse logistical and environmental conditions while maintaining low-carbon and climate-responsive design principles. This approach allows future material innovation and incremental upgrading without dismantling the entire structure.

Axis B highlighted the role of stable housing as an enabling condition for economic participation. Rather than restricting employment opportunities to construction-related activities, the study emphasized a job-type–unrestricted employment model in which secure housing supports access to diverse forms of work. This perspective reframes housing not as an isolated welfare intervention, but as an essential infrastructure that supports skill development, income stability, and reduced dependency on external aid.

Axis C addressed the long-term integration potential of the proposed housing model within urban and regional systems. The findings suggest that adaptable, semi-permanent housing can serve as a bridge between displacement settlements and surrounding communities, whether in urban, peri-urban, or hard-to-access regions. By supporting continuity in daily life and economic activity, the model contributes to social cohesion and gradual spatial integration rather than long-term segregation.

In response to the final research question—How can environments be created in which displaced people are no longer defined by displacement?—this study argues that stable, adaptable housing is a critical starting point. When combined with flexible employment pathways and integration-oriented planning, housing can enable displaced individuals to transition from temporary survival toward long-term autonomy.

While this research is conceptual in nature and subject to limitations regarding empirical validation, it provides a transferable framework for future studies and pilot projects. Further research involving simulations, field testing, and collaboration with public and private actors could refine the model and support its practical implementation. Ultimately, this study positions housing as a central component in creating environments where displacement does not define a person’s future, but rather becomes a stage toward sustainable recovery and inclusion.

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Global poverty and the development of multilingual speakers

～Continuous support～

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Overview (Abstract) of the Research”

1. Introduction (Research Background, Significance, and Objectives)

1－1 Social Trends (Current Situation and Issues)

Currently, it is said that 767 million people—about one in ten worldwide—live in extreme poverty, defined as surviving on less than 1.9 dollars per day. Nearly half of them, about 385 million, are children, meaning that one in five children around the world lives under such conditions.
The standard for poverty varies by country and region, but it generally refers to a situation in which people are unable to earn the minimum income necessary to maintain an adequate standard of living. In Japan as well, issues such as poverty among single mothers, children, and young people have become significant concerns.

When people fall into poverty, various problems arise. Without sufficient income, they may not be able to eat enough nutritious food or receive proper medical treatment when ill, leading to hunger or shortened life expectancy. Poverty can also force both adults and children into excessive or hazardous labor. As a result, many children lose access to proper education, which contributes to the cycle of poverty being passed from one generation to the next.

Why, then, does poverty occur in the first place? There are many causes, including the economic situations of developed countries and the insufficient establishment of cooperative relationships between developed and developing nations. Among these, the impact of conflicts and civil wars is particularly significant. For example, in many developing countries, borders were drawn during colonial times, forcing diverse ethnic groups to live within a single nation. In the process of integrating such states, authoritarian leaders often emerged, granting benefits to close associates and forming political power structures. This background has allowed corruption to persist into the present day, enabling only a small group of people to gain advantages while many others suffer.

Conflicts and civil wars continue to occur around the world today. Their causes vary, including ethnic or religious tensions, disputes over land or resources, and opposition to authoritarian regimes. When conflict breaks out, many people become refugees in order to escape the violence, and children may face exploitation, such as being forced into armed groups or subjected to other forms of abuse. These circumstances create not only poverty but a wide range of additional humanitarian crises. Because this problem is likely to worsen in the future, it is essential that we start addressing it now.

1－2 **Previous Research 1**

According to Naomi Hatsukano in Ajiken World Trend, published by the Japan External Trade Organization (JETRO) and the Institute of Developing Economies, the historical development of global poverty is introduced and discussed.
According to the Summary of Doctoral Thesis and Report of Examination by Dr. Hiroko Shimazaki, the current issues of human trafficking in Cambodia are examined based on various perspectives, including the background and contributing factors.

1－3 **Research Question**

How can the language barriers in education be overcome?
To address this issue, two broad approaches can be considered: one in which developed countries support developing nations, and another in which problems within developing countries are addressed through cooperation between developed countries and local communities. However, because the effects of conflict-related factors and crimes such as human trafficking are significant, I felt that a method capable of directly improving domestic conditions is necessary. For that reason, educational development is essential. Among the issues related to education, the problem of educational quality seems appropriate as the research question for this study. In addition, one fundamental reason poverty is difficult to resolve is that large linguistic diversity makes improvement challenging.

1－4 **Hypothesis**

It can be argued that inadequate teacher training and the lack of sufficient educational personnel are key factors leading to the low quality of education.

2. **Research Methods**

1. Do a quick preliminary search.
2. Formulate a research question to grasp the outline of the problem.
3. Read previous studies and papers relevant to the research question.
4. From the collected information, consider what new questions can be posed.
5. Conduct more detailed research so that concrete answers can be obtained for those questions.
6. Reflect on and revise the findings from multiple perspectives.

3. **Results and Discussion of the Research**

（ｉ）**The Current State of Education and the Allocation of Funding**

What kinds of educational initiatives currently exist in impoverished countries?

According to JICA, educational assistance is provided mainly through three forms of aid: technical cooperation, loan aid (yen loans), and grant aid. Technical cooperation supports the “soft” aspects of education, such as teacher training and improvements in school management, while loan and grant aid support “hard” aspects such as school construction.

Focusing specifically on technical cooperation, it is implemented through expert dispatch, training programs in Japan, technical cooperation projects, and development planning–type technical cooperation. Among these, technical cooperation projects, which combine expert dispatch and trainee programs, can be considered the core activity of technical cooperation.

An important point here is that some forms of assistance require repayment, while others do not. The fundamental difference between investment and loan-based assistance is whether the recipient must repay the funds. Although both aim to produce long-term benefits, in the context of poverty reduction, loan-based assistance is often more crucial. This is because investment alone may lack sustainability; in regions such as Africa, it is difficult to ensure when—or even whether—the benefits will return, potentially slowing development indefinitely.

Thus, donors must choose whether to impose repayment obligations. Examples of aid with repayment obligations include the dispatch of experts, human resource training, and the provision of necessary equipment. Examples without repayment obligations include the construction of primary and secondary schools.

Since this study focuses on education, it will mainly examine the forms of assistance that involve repayment obligations.

（Ⅱ）Issues Related to Education

Major educational issues include curriculum development, teacher–student interaction, and language barriers.

First, regarding the need and potential for curriculum development, it must be examined from three perspectives—society, academic disciplines, and children. Among these, the social dimension plays a particularly significant role. Therefore, curriculum considerations must take into account the social and historical context, and the idea of “learner-centered” instruction has been defined within these sociocultural conditions.

However, conducting research that incorporates sociocultural perspectives requires a deep understanding of the specific national context, making implementation challenging. In other words, uniformly applying the

same educational programs across different countries can lead not to improvement, but to negative consequences.

Research on how teachers respond to students' incorrect answers, and how students feel about such responses, shows that many teachers tend to ignore or dismiss incorrect answers. Many students consequently report feeling discouraged or embarrassed.

Regarding Africa's language issues, since the 1990s there has been a movement advocating the rights of African languages under the banner of "multilingualism." Multilingualism is the idea that all languages should be granted equal value and rights, and UNESCO also promotes this principle. However, multilingualism creates major challenges for education. This is because Africa has more than 2,000 languages, and respecting each one requires enormous resources, making it unrealistic to support all languages equally.

In fact, even in countries such as Senegal and South Africa—where many ethnic languages are officially recognized—administration is still conducted largely in English or French, meaning that practical multilingualism has not been fully realized. On the other hand, choosing only certain languages as official or instructional languages leads to inequality among linguistic groups. Thus, the implementation of practical and equitable multilingualism remains extremely difficult.

For this study, I chose to focus particularly on multilingualism, as it appears to be one of the most challenging issues to resolve.

（Ⅲ）Language Issues

Language policy significantly influences which ethnic or social groups gain access to educational and social opportunities. Because such policies shape—and are shaped by—the power structures and social composition of a society, they must be considered with far more caution than often assumed.

From a linguistic perspective, all languages have equal intrinsic value regardless of the number of speakers. However, in society, the influence of a language differs greatly depending on who has access to it and what advantages proficiency in that language provides. Indeed, there are real cases in which the education systems imposed during colonial rule continue to affect countries today.

While scholars and intellectuals emphasize the importance of mother-tongue education, such arguments cannot be persuasive unless the general public in African countries sees clear social and economic benefits to learning in African languages. Without an environment where people feel that being educated in these languages leads to real opportunities, support for mother-tongue education will remain limited.

Therefore, African nations must implement concrete measures to enhance the social and economic value of African languages and improve their status in society. For Africa to achieve genuine autonomy, the international community—including former colonial powers—should support these efforts, even if doing so reduces their own cultural or economic influence.

4. **Conclusion and Future Prospects**

In conclusion, this study examined whether respecting multilingualism can truly lead to Africa's genuine independence. The analysis suggests that while a certain degree of respect for multilingualism is necessary, adopting a common official language for broader support and communication is a more practical approach.

Although this research focused on the language of education, there remains a lack of studies on the perspectives of people living in impoverished countries—such as whether they are willing to accept education in the first place, and how educational initiatives can be effectively communicated to them. Ultimately, no progress can be made unless educational programs are accepted by local communities. Moreover, this is a highly complex issue that is difficult to resolve and continues to be debated worldwide. Therefore, conducting further research on these challenges, in combination with the present study, would be highly meaningful.

5. **Citations and References**

我が国の理数科教育協力の実践と理数科教育開発研究の動向：サブサハラ・アフリカを中心に
高阪将人　The text describes the background of science and mathematics education and the competencies that will be required for teachers to further improve their practice in the future.
北川香織　2015 「ルワンダにおける教授言語変更後の学校教育―公立学校で働く職員の視点から―」『アフリカ教育研究』
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It introduces an overview of global poverty issues.
初鹿野直美 - アジ研ワールド・トレンド』, 国際貿易振興機構・アジア経済
According to this, the historical background of poverty is explained.

島﨑 裕子氏による博士学位論文審査報告書

Summary of Doctoral Thesis and Report of Examination

According to the author, the current challenges of human trafficking in Cambodia are examined through an analysis of its background from multiple viewpoints.

Development of education in Sabsaharan-Africa

~For breaking free from poverty~

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Abstract

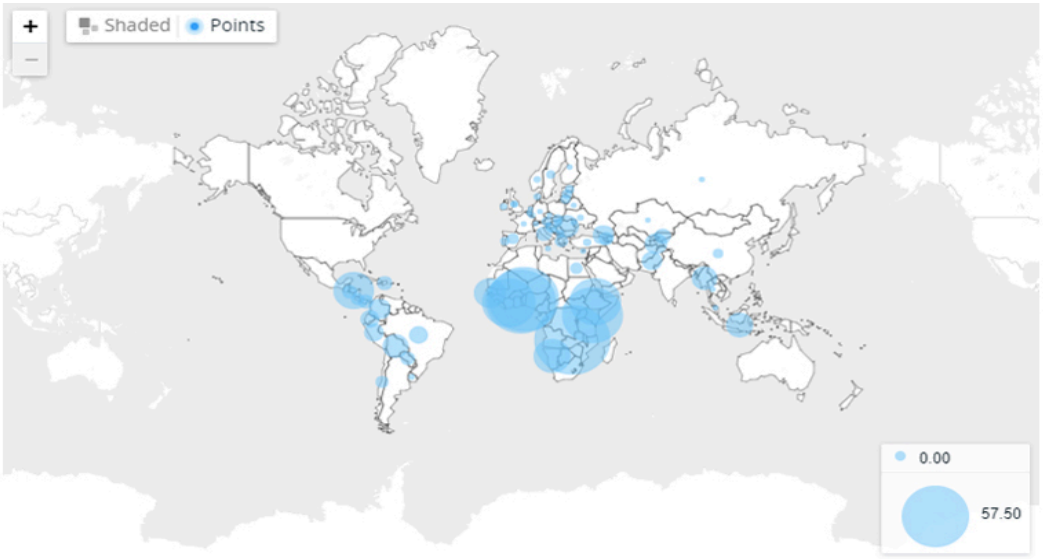
Poverty is a big problem in sab-saharan Africa and actually, 40% of the population of this region is said to be in poverty. To reduce poverty, this research aims to improve the quality of education. And then, I set this research question. “What is the measure to provide high quality education in sub-saharan africa? How does it contribute to reducing poverty?” I retrieved that previous research. He insisted that financial support is not enough because it is not the measure which is based on the actual situation in the developing world. However, the bulk of aid in recent years is by financial support. Therefore, rapid changes of situation are necessary. In this context, financial support means sending textbooks made by an organization of education. Teachers who have never been taught by using the same textbook cannot teach their students by using them. Also, when I searched for the problem of education in developing countries, I found that the low quality of education is one of them. So to solve this problem, I set this hypothesis; “By sending teachers to schools in developing countries, they will teach teachers in their countries about how to instruct students or how to use textbooks for good education.” As I mentioned, teachers in developing countries will not be able to teach their students by using textbooks given by financial support. Teachers from other countries will help teachers in developing countries to teach students. Also, I found another piece of literature: “How AI can revive a love of learning?” It is written about the advantages of using AI in education. For example, AI can store an enormous amount of data of students and make a studying plan for each student, using its data. I think using these tools in education will lead to providing a higher quality of education and reduce the burden on teachers. Actually, one of the problems of education in developing countries is the lack of teachers, so AI will resolve this problem. However, it is unknown how to incorporate AI into teaching; the problem of technology and people’s ignorance of AI. Regarding instructing teachers, it is necessary to think about how to select teachers who instruct teachers in developing countries, and it is unknown whether its measure is effective or not. I want to think about these questions from now on.

1. Introduction

Poverty is a big problem in sab-saharan Africa and actually, 40% of the population of this region is said to be in poverty.(graph 1) One of the reasons for poverty is the intergenerational chain; the children in low-income families are forced to do manual work and can’t study enough. It leads to those children not being able to earn enough money in the future and suffering poverty. According to the survey of the world bank in 2022, the lower income the families get, the less the parents have their children to study. We can see the correlation between poverty and education. As we can see, education is effective to break free from poverty. Recently, financial support for

education in developing countries is being conducted on a global scale and as a result the number of children who go to school is increasing. However, the quality of education in those countries is much inferior to that in developed countries. This research aims to improve the quality of education for the goal to reduce poverty.

Graph 1



1-1. Social Context

To resolve poverty in sab-saharan Africa, this research points to education. It is said that the rate of poverty in sab-saharan Africa is the highest in the world. I think improving the quality of education in these regions will lead to a better society.

1-2. Previous Research

My preliminary research utilized "Africa's Education Development and International Cooperation: Integration of Policy Research and Fieldwork" by Nobuhide Sawamura.In this work, Sawamura argues that the majority of current international aid is provided through financial assistance, which often fails to incorporate local conditions and, consequently, does not lead to effective measures. He emphasizes the critical importance of fieldwork for developing truly effective interventions.However, since specific, concrete strategies were not explicitly detailed in his paper, I feel compelled to explore what kinds of initiatives, beyond mere financial aid, should be undertaken to more effectively improve conditions on the ground.

1-3. Research Question (RQ)

I set the research question below.;”What is the measure to provide high quality education in sub-saharan africa? How does it affect poverty? “ As I mentioned, the Sub-Saharan Africa region faces particularly severe poverty. Since education is a recognized and effective pathway out of poverty, the goal of this research is to focus on improving the quality of education in this region.Indeed, the severity of the educational crisis in this area is evident: according to OECD surveys, countries from Sub-Saharan Africa occupy both the first and second worst rankings in terms of educational quality.

1-4. Hypothesis

For the second piece of preliminary research, I utilized "The Current Status and Challenges of Educational Development in the African Region" also by Nobuhide Sawamura.This paper outlines the problems in African education, specifically highlighting issues concerning teacher quality and the challenges inherent in the educational aid provided by various countries to date. He mentioned that teachers cannot teach students effectively because they don’t know how to use textbooks effectively. As we can see, the measures that really work in the real situation are necessary. Therefore, as a hypothesis, I say that “by sending teachers to schools in developing countries, they will teach teachers in their countries about how to instruct students or how to use textbooks for good education.”

2. Research Method

My subsequent step will be to investigate existing literature on Teacher Education to grasp the current challenges and deficiencies within the system. Based on this understanding of the problems, I intend to formulate effective proposals that aim to eliminate these issues as much as possible.

3. Results and Discussion

3-1 Results

For my preliminary research on teacher education, I utilized the JICA report, "Teacher Training: Challenges in Developing Countries and Japan's Experience."This document outlined several challenges concerning teacher education in developing nations. Specifically, it highlighted issues related to the long-term sustainability of teacher competence and the mismatch between the content of teacher training programs and the actual needs of local classrooms.As these findings demonstrate, it can be concluded that the effectiveness of teacher education in developing countries often remains temporary, and the training provided is not sufficiently aligned with the practical requirements of the local educational context.

3-2 Discussion

I think temporary teacher education is effective for the long term.Another major challenge is creating education that truly fits the local context. We cannot expect to achieve real results by simply taking one "ideal" education plan and applying it to every region in the same way. To solve this, we absolutely need to understand the reality of education on the ground in each location. Therefore, it is essential to investigate key factors for each specific region, such as the current level of educational quality and the local people's living conditions. Based on this data, we must then figure out the best plan for each area individually. When considering the hypotheses developed from the research (1-4), I believe the issue of making teacher training sustainable can be addressed by conducting teacher training programs regularly in the local area. Regarding the challenge of developing locally relevant education, I feel this could be improved by sending trainers to the region to conduct teacher education directly with local teachers. Also, I used another literature, “How A.I. Can Revive a Love of Learning”
In this literature, the author said AI can deal with enormous amounts of information from each student, so it can make studying plans for each student. By using AI, it may be possible to provide higher quality education in the developing world regardless of its situation.

4. Conclusion and Future Prospects

This study looked at how to improve education in Sub-Saharan Africa to help people escape poverty. Our final main idea is this. First, we must study exactly what is happening in local schools. Then, we need to send teachers to the region to teach and guide the local teachers directly. This training must be done regularly to ensure it lasts. As we discussed, current international aid for education often only involves giving money or fails because it doesn't really understand the local situation. This approach hasn't been very effective. We believe our proposal can solve these current problems and significantly help to raise the quality of education on the ground. Our ultimate goal is for the Sub-Saharan region to eventually become independent and be able to provide good education on its own. For the future, we need to figure out more details, such as how to hire the right trainers to send and how to create a clear global system for this kind of teacher education. Also, regarding AI, I think that AI and people need to collaborate and compensate for things that others can’t do, each other.

5. References

「アフリカへ質の高い教育を支援するプロジェクト」英国ワールドモバイル社と発足
https://prtimes.jp/main/html/rd/p/000000048.000042912.html
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Reducing Homeless

～Preventing Re-Homelessness~

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Abstract
Today, not only is the number of homeleess people increasing, but re-homelessness is also becoming a problem.In this paper, I focus on re-homelessness and examine existing information mainly through online sources.I found that the length of support is important, and that helping people get a stable income is especially necessary.However, the situation is different in each country, so the best solutions are also different. Thinking about these solutions will be my next task.

1. Introduction (Background, Significance, and Purpose)

When I first saw the estimate that about one out of eighteen people in the world live in unsafe housing conditions, I realized how serious this problem is. Although the numbers vary by source, the scale of the issue is clearly larger than I had expected.I was very surprised that homelessness is not only a problem in Japan but also a problem all over the world, and that so many people are affected. I also became interested because this problem is related to having a home.I found that in Japan there are some programs to reduce the number of homeless people, but the number has not decreased very much.

1-1. Social Context (Current Situation and Problems)

On the contrary, because of COVID-19, the number might even be increasing, although I do not know the exact number. So I decided to research what we can do to reduce homelessness and what kinds of support are effective.

1-2. Previous Research

This paper is “The Limits of Homeless Policies in Local Governments,” written by Yumi Sue in 2007. The paper explains that local governments have limits in supporting homeless people. Many support systems are made for “residents,” so they do not work well for homeless people, who are not considered residents.In Tokyo, many methods have been tried, but it is still difficult to support homeless people directly. The paper says that local governments have limits because the living standards of residents and homeless people are very different. There are other support systems besides public assistance, but each of them still has problems. Because of these limits, the author says that improvements are needed. I want to use the problems written in this paper for my research.

1-3. Research Question (RQ)

How can homeless people live independently for a long time?
Homelessness can influence the surrounding environment.
For example, people without a place to stay may have difficulty maintaining hygiene or may end up resting in public areas, which can cause discomfort for others.It is said that the number of homeless people is increasing today. We cannot know the exact number in the world, but including the effects of COVID-19, it is believed that about one out of eighteen people is in an unsafe housing situation. This means the real number may be even higher. If the number of homeless people increases, the negative effects will also increase, so I think we must reduce homelessness. This is the reason and importance of my research.However, for homeless people to stop being homeless, they need to overcome the big barrier of “returning to society.”

Even after they return, they must continue living without becoming homeless again. There are support activities and policies in Japan and in the world, but the number of homeless people is still increasing. Also, many people become homeless again, which is called *re-homelessness*. At present, there are not many policies that focus on preventing re-homelessness.Therefore, the problem of re-homelessness is very serious and will continue to become worse. To reduce homelessness, we need ways to stop re-homelessness. I want to research what kinds of methods can do this.

1-4. Hypothesis

First, I thought that homelessness can be solved if four conditions are met: money, skills, work, and reducing anxiety about returning to society.Money and work are closely connected. Without work, stable income is impossible, and without income, it becomes difficult to maintain housing. This seemed obvious at first, but while researching, I realized how strongly these two factors influence the risk of re-homelessness.With the money they earn, they can support their lives and live independently.Next, skills are also important. Some people may not have enough skills, and in some countries or areas, this can make it hard to build or keep a home. So I think it is necessary to provide some kind of skill support.Finally, reducing anxiety about returning to society is important. Many people feel nervous about living in group support centers, and this is also one cause of re-homelessness. For this reason, I think this point is also a very important factor.

2. Research Method

To begin, I clarified the focus of my research by deciding which groups to look at and what issues to examine.I will also research the places, countries, or regions where many homeless people live, and look at their characteristics.Next, I will find the problems in the current support systems used in those countries. I will also look for countries that succeeded in reducing homelessness in similar situations and study the examples of their strategies.Since Japan is known as one of the countries with a smaller number of homeless people, I want to include Japan as one of my reference cases.Then, I will examine possible ways to reduce homelessness, especially cases of re-homelessness. At this stage, most of my information will come from online sources, so I plan to compare different reports carefully to understand the major causes.

3. Results and Discussion

3-1 Results

This study found that homelessness is particularly common in lower-income, middle-income, and impoverished countries. It also became clear that global data on age and gender trends is inconsistent, and the situation varies widely by country. In addition, existing research shows that the expiration of the stay period in self-support shelters is one of the major factors contributing to people becoming homeless again after once leaving homelessness. Among the countries selected as targets Nigeria, Yemen, Afghanistan, and Pakistan information on homelessness policies was scarce and often unreliable, making direct comparison difficult.

However, a common factor contributing to homelessness in these countries was low and unstable income.

3-2 Discussion（考察）

The results of this study suggest that two things are especially important for preventing people from becoming homeless again: how long they receive support and whether they can get a stable income.In many countries, the support period is short,meaning people often return to society before feeling prepared. Even when job training is provided, a short support period makes it difficult for people to build a stable income. This was one of the points that felt especially significant to me while reviewing the cases.In low-income and middle-income countries, there are also basic problems such as weak government systems and not having enough clear data about homelessness. Because of this, it is harder for these countries to provide long-term support. It is also important to help people feel less worried about returning to society by creating an environment where they can receive support safely. Overall, support that lasts longer and helps people get a stable income is important for reducing re-homelessness.

4. Conclusion and Future Prospects

This study showed that many homeless people live in low-income and middle-income countries, and that unstable income and short support periods are major causes of re-homelessness. Improving these factors could help reduce homelessness and create safer living conditions. However, this research faced limits because detailed data from the target countries was not available. Future research needs to focus on collecting more accurate data and understanding the situation of re-homelessness in each country. I also realized that my research was limited by the lack of reliable information, so identifying better data sources will be an important task for me going forward.It is also important to study how long support programs should last and how much income support is necessary for people to live independently. Since homeless people around the world have different backgrounds and needs, developing support methods that match each situation will be an important task for future studies.

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Child Malnutrition Problem

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Abstract （研究の概要）

This research addresses the global tri-morbidity of child malnutrition (under-nutrition, hidden hunger, and overweight/obesity). The study aims to find sustainable solutions to prevent malnutrition in children under five, focusing on two main approaches: **policy intervention** (taxation on unhealthy foods and front-of-pack labeling) and **practical food solutions**. Based on literature review and data analysis, the study proposes that combining local, nutrient-dense ingredients (like moringa and edible insects) with educational programs and simple recipes (like fortified porridge) is the most effective approach. The overall hypothesis is that country-level food system legislation, coupled with community-based nutritional support using local resources, will significantly reduce childhood malnutrition rates.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

Globally, one in three children under five suffers from developmental issues caused by the triple burden of malnutrition: under-nutrition (stunting and wasting), hidden hunger (micronutrient deficiencies), and overweight/obesity. Specifically, 149 million children under five were stunted and 50 million were wasted in 2018. Hidden hunger affects at least 340 million children. Overweight and obesity rates have also drastically increased (10–12 times

since the 1970s). Regions like South Asia, Southeast Asia, and Central Africa show the highest percentages of affected children. This early-life nutritional failure, especially during the crucial first 1,000 days (from conception to age two), results in lifelong cognitive and health consequences.

1-2. Previous Research

Previous efforts to tackle malnutrition include Sugar Taxes (e.g., Mexico saw a 9.7% drop in consumption of taxed beverages in 2015; France saw a 6.1% drop in Cola consumption) and comprehensive Food Labeling Laws (front-of-pack warnings, regulation of child-targeted advertising). Furthermore, local solutions like the Nutrix Ready-to-Use Therapeutic Food (RUTF) in Cambodia (made from local fish, rice, and beans) demonstrate that locally sourced options can be more affordable and culturally appropriate than imported, milk-based products. These policy and nutritional interventions show promise but highlight the need for solutions that are both locally adaptable and globally scalable.

1-3. Research Question (RQ)

What sustainable and effective interventions—combining policy reform and community-based, practical nutritional solutions—can be implemented to prevent malnutrition in children under five?

1-4. Hypothesis

Implementing national food system legislation (such as sugar/salt taxes and mandatory nutritional labeling) combined with a grassroots strategy of providing culturally appropriate, easily prepared nutritious food made from local ingredients will significantly decrease childhood malnutrition rates.

2. Research Method

The research will employ a mixed-method literature study.

Desk Research and Data Analysis: Information will be collected primarily through reliable sources such as the Japan UNICEF Association website, World Health Organization (WHO) reports, and relevant academic journals (e.g., focusing on the efficacy of food taxes and RUTF programs).

Comparative Case Study: Analysis of successful/failed nutritional programs (e.g., Ethiopia's community health programs, Cambodia's Nutrix initiative) to identify key factors for local adoption and sustainability.

Proposal Development (Solution Synthesis): Based on the literature, a set of feasible policy recommendations and a concrete proposal for a local, easily made nutritious food will be created. The proposal will utilize highly nutritious, locally available sources (Moringa, watercress, edible insects like crickets/termites) that address micronutrient and protein deficiencies often found in malnourished populations.

3. Results and Discussion

3-1 Results（結果）

The investigation revealed that the malnutrition problem requires a multifaceted approach addressing all three burdens (under-nutrition, hidden hunger, and overweight).

- Policy Effectiveness: Data confirms that national legislation like the Sugar Tax significantly reduces the consumption of taxed beverages (e.g., Mexico: 9.7% decrease). Similarly, Warning Food Labels are proven to guide consumer behavior away from high-calorie, high-salt, and high-sugar items.
- Nutritional Gaps: Severe acute malnutrition (SAM) treatment rates remain low (e.g., only 6% in Cambodia). This highlights the need for accessible and affordable therapeutic food.
- Local Ignorance: UNICEF's Ethiopia findings show that parents often lack knowledge regarding: 1) The simple preparation of nutritious meals using local ingredients, 2) The link between proper nutrition and child development, and 3) The need to seek health facilities rather than traditional healers for malnutrition.
- High-Potential Ingredients: Locally sourced items like Moringa (90 nutrients), Watercress (high nutrient density), and Edible Insects (high protein/fiber, prevalent in Asia/Africa) are highly nutritious but often underutilized as primary child nutrition sources in affected communities.

3-2 Discussion（考察）

The results indicate that solely relying on policy (taxation/labeling) addresses the *overweight/obesity* burden in urban settings but is insufficient for the *under-nutrition/hidden hunger* prevalent in rural, low-income areas.

- Proposal Refinement (Integrating Innovation and Global Insights): To address the core RQ, the proposal is refined to focus on sustainability through localization and education.
    - Proposal 1 (Policy): Implement Sugar/Salt Taxes and Nutrient Score/Warning Labels to curb excessive intake and promote healthier purchasing habits (targeting the overweight burden).
    - Proposal 2 (Localized Solution): Develop a Fortified Porridge (Oka-yu) recipe using locally available, highly nutritious, but underutilized ingredients (e.g., Moringa, Crickets). Porridge is universally easy to prepare, quick to absorb, and digestible for sick children.
    - Proposal 3 (Dissemination - Insights from Overseas Media): Directly address the knowledge gap found in the Ethiopia study. Educational efforts must teach caregivers: a) How to prepare the new nutritious food using local flora and fauna, b) What malnutrition is, and c) Where to seek appropriate medical treatment (not just traditional healers). This approach, rooted in community empowerment (as highlighted by the Tanzania research in Section ②), ensures

long-term adoption and impact.

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To efficiently process solar panels at the time of disposal

~Effectively utilizing supercritical fluids~

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Abstract

As the use of solar power continues to expand, a growing number of solar panels are approaching the end of their lifespan, creating a significant waste challenge. This study examines supercritical water technology as a potential method for recycling and treating these used panels. Earlier research has shown that supercritical water can break down the resin materials within panels and enable efficient recovery of metals and glass. Other approaches—such as high-temperature peeling or high-pressure hot-water extraction for rare

metals—are also being developed, though many of them are effective only for certain types of materials.

In this paper, we compare these different methods and discuss their respective strengths. Our findings suggest that supercritical water processing is particularly promising because it can recover multiple materials in a single operation. However, the method still faces hurdles, including high energy demands and the cost of specialized equipment. Future research should focus on improving the system and evaluating its performance at larger, practical scales.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

Solar power has been expanding rapidly across the world, and for good reason—it helps cut down on fossil fuel use and reduces carbon emissions. But solar panels don't last forever. Most of them operate reliably for about 25 to 30 years before their performance begins to decline. Once they reach that point, we have to figure out how to dispose of them responsibly.

The challenge is that our current recycling and disposal systems are still catching up, and as a result, many panels end up as waste. This is a problem because solar panels contain glass, various metals, and other materials that aren't easy to separate or process. If they're not handled properly, they can pose environmental risks. Improving the way we manage end-of-life solar panels is becoming increasingly important as we move toward a more sustainable society.

1-2. Previous Research

Researchers have explored a wide range of approaches for recycling and treating old solar panels. Some techniques rely on mechanical separation to recover metals and glass, while others use heat to remove adhesives or split the layers apart. Recent work has shown that supercritical water technology can break down polymer components and recover metals such as aluminum and copper. Another research group developed a hydrothermal process capable of extracting rare elements like antimony from panel glass. There are also new high-pressure methods that can peel glass from panels without damaging its quality.

Taken together, these studies highlight meaningful progress, but they also make it clear that no single method has solved every challenge yet.

1-3. Research Question (RQ)

This research asks: Can supercritical water processing be a good way to treat old solar panels and improve material recovery? We also compare this method with other approaches like hydrothermal extraction of metals and heat-based separation.

1-4. Hypothesis

We assume that supercritical water technology is an effective way to break down organic parts of solar panels and help recover materials, and it may be better than some older methods. We think metals and glass can be separated more cleanly with this method, which may reduce environmental harm.

2. Research Method

Papers, Internet search

3. Results and Discussion

3-1 Results

In this section, we describe findings from existing research and discuss what they mean for solar panel disposal.

Supercritical Water Technology

Supercritical water technology uses water at extremely high temperatures and pressures to break down the organic materials inside solar panels. In one study, the method removed nearly all of the polymers and enabled the recovery of metals such as aluminum and copper with an efficiency of around 76%. After treatment, the remaining solid parts are essentially free of organic matter, making it easier to separate and recycle the metals. This approach is particularly promising because it can handle both organic and inorganic components in a single step.

Other Methods for Comparison

The hydrothermal extraction method uses high-pressure hot water to recover rare elements such as antimony from panel glass. In one study, the process was able to recover about 80% of the antimony, suggesting that water-based, high-pressure techniques can effectively extract certain valuable elements. However, this approach does not break down every component of a solar panel

Heat-based separation methods take a different route, using high temperatures to remove adhesives or split the layered structure. These techniques can free the glass for recycling, but they often require multiple steps and a considerable amount of energy.

3-2 Discussion

Supercritical water processing shows strong potential because it can break down tough organic materials and allow high metal recovery in one process. However, this technology

needs more development to reduce energy use and cost. Hydrothermal extraction is helpful for specific elements, but it does not handle all panel parts. Heat separation needs careful control of temperature and still might leave mixed waste that is hard to recycle. Altogether, comparing these methods suggests supercritical water processing may be more comprehensive.

4. Conclusion and Future Prospects

In this study, we examined several approaches for dealing with end-of-life solar panels. Among them, supercritical water technology stood out because it can break down polymers and help recover valuable metals more efficiently. Other techniques—such as hydrothermal extraction and heat-based separation—offer certain advantages as well, but they don't always work for all of the materials found in a panel. Supercritical water processing has the potential to become a stronger option, provided that issues related to cost and energy use can be addressed.

Looking ahead, larger-scale, real-world testing will be important to understand how well this technology performs outside the laboratory. It may also be useful to explore combinations of methods—for example, applying hydrothermal extraction after supercritical processing—to improve overall recovery rates. As the number of aging solar panels increases through the 2030s, developing reliable and efficient recycling systems will become even more critical.

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The possibilities of vertical farming for food security

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Abstract

This research explores the potential of vertical farming as a complementary agricultural method to strengthen global food security. As agricultural challenges intensify in both major farming nations and countries with limited arable land, the need for resilient and resource-efficient food production systems is increasing. By investigating the profit margins,

operational challenges, and revenue structures of vertical farming in selected countries, this study aims to evaluate whether vertical farming can be an economically and environmentally viable solution. The findings are expected to show that vertical farming should not fully replace conventional agriculture but can serve as an effective complementary system when used within the limits of local land fertility and resource availability.

1. Introduction (Background, Significance, and Purpose)

In a Benthamite society—where any gain by one party necessarily entails an equivalent loss by another—it seems reasonable to consider increasing the total amount of wealth circulating in the world as an effective approach to solving various global issues. Yet this raises a fundamental question: *What exactly is this "wealth"?*

During last year's research on economic systems, I realized that a substantial portion of this wealth consists of agricultural capital. Furthermore, through my learning at the Tokyo Forum this year, I came to recognize the need to move away from the current model of economic growth driven by the exploitation of nature and to envision a new economy grounded in sustainability.

Last year, in order to sustainably increase agricultural capital, I proposed partially adopting a planned economy and creating a highly efficient, intensive agricultural system through concentrated use of advanced technologies. However, having recognized the intrinsic limitations of planned economies, I began searching for alternative approaches. Vertical farming has emerged as a promising solution to address global food insecurity, especially in regions with limited arable land or unstable agricultural conditions. As climate change, soil degradation, and population growth intensify pressure on traditional agriculture, alternative food production systems are increasingly important. The purpose of this research is to examine whether vertical farming can provide an efficient and economically viable option to support food security and how it can complement existing agricultural systems.

1-1. Social Context (Current Situation and Problems)

Global agriculture is facing a critical turning point. Major farming nations are experiencing declining soil fertility, labor shortages, water scarcity, and unpredictable climate patterns. At the same time, many countries with poor agricultural conditions are becoming more dependent on food imports, making them vulnerable to international market fluctuations and geopolitical tensions. These challenges highlight the urgent need for sustainable and stable food-production systems that do not rely solely on traditional open-field agriculture.

1-2. Previous Research

Previous studies have investigated both the potential and limitations of vertical farming. Many researchers emphasize its strengths: higher yield per area, protection from weather, and reduced pesticide use. However, recent research—especially Lovat, Noor, and Milo (2024)—has pointed out that vertical farming requires extremely high energy input, particularly for lighting and climate control. While some studies argue that technological innovation could reduce these costs, others claim that vertical farming is economically viable

only for high-value leafy greens. These mixed findings suggest that vertical farming cannot fully replace conventional agriculture but may serve a strategic role depending on crop type and energy availability.

1-3. Research Question (RQ)

Is vertical farming an efficient and economically viable method for improving global food security?

This question is important because many countries are searching for stable food-production methods that are less vulnerable to climate and land constraints. Evaluating efficiency and viability—including profitability, energy consumption, and crop suitability—is crucial to determining whether vertical farming can meaningfully support food security.

1-4. Hypothesis

I hypothesize that vertical farming can contribute to food security only as a complementary system, not as a full replacement for traditional agriculture. This hypothesis is based on previous research showing high energy costs, limited suitability for staple crops, and the economic success of vertical farms primarily in leafy vegetables. Therefore, vertical farming is expected to be most effective when combined with conventional agriculture within the limits of land fertility and supported by renewable energy.

2. Research Method

This study adopts a **comparative literature analysis** of academic papers, industry reports, and energy-efficiency calculations. First, I reviewed peer-reviewed papers on vertical farming economics, including studies on energy requirements, crop yields, and technological constraints. Second, I analyzed data from existing vertical farms across different countries, focusing on profit margins and operational structures. Third, I compared findings across regions to evaluate the factors influencing economic viability, such as climate, energy policy, and crop selection. Finally, I examined how these findings support or contradict my hypothesis and addressed the research question through synthesis and comparison.

3. Results and Discussion

3-1 Results（結果）

Energy-to-food conversion efficiency in vertical farms is extremely low.
Across multiple operational vertical farms, the median and mean energetic conversion efficiency—defined as the ratio of edible plant chemical energy to purchased electricity—was approximately 1%, with a range from 0.4% to 1.9%.

Example of commercial production:
One commercial lettuce farm consumed 5 million kWh of electricity annually to produce 500,000 kg of lettuce, equivalent to 10 kWh per kg of fresh lettuce.

Since lettuce contains only about 0.1 kWh (≈120 kcal) per kg, this corresponds to roughly 1% energy conversion efficiency.

Minimum electricity cost for dry crops is around US$10 per kg.
Even with an optimistic efficiency of 2%, vertical farming requires electricity costing ≈$10 per kg of dry plant matter.

Comparison with global grain prices shows a huge cost gap.
Many globally traded dry crops (wheat, corn, soybeans, rice) typically sell for $0.1–1.0 per kg at the farm gate.
This means vertical farms are 10× to 100× more expensive for dry matter.

Leafy vegetables have lower effective energy requirements.
Because leafy vegetables contain much more water and less dry matter, their energy requirements are lower.
Estimated electricity cost for lettuce or tomatoes is roughly 0.5 USD per kg (fresh weight)—similar to greenhouse or open-field production costs.

However, electricity cost alone is not enough.
These estimates exclude major cost components such as:

- facility construction,
- HVAC and lighting infrastructure,
- labor,
- automation,
- distribution costs.
  Including these would raise the total cost substantially.

Environmental impact depends heavily on electricity source.
Using the average global electricity mix, vertical farming can emit up to 50 kg CO_2-eq per kg of dry matter.
Low-carbon electricity could reduce this, but large improvements in energy efficiency and renewable energy availability are still required.

These results indicate that vertical farming provides specific advantages but also faces structural limitations.

3-2 Discussion

The results support the hypothesis that vertical farming is not yet a complete replacement for traditional agriculture. The high energy cost, confirmed by recent global research, significantly limits its scalability for staple crops. This aligns with overseas perspectives showing that the economic model of vertical farming is currently suitable only for high-value, fast-growing produce.

However, innovation studies suggest a new approach: turning constraints into opportunities.

By integrating renewable energy, AI-assisted climate control, and more efficient LED technologies, the viability of vertical farming could improve. Additionally, combining vertical farming with conventional agriculture can reduce dependence on imports in agriculturally disadvantaged regions.

In summary, the findings indicate that vertical farming holds strategic potential when used as a complementary system, and further technological innovation is essential for expanding its role in food security.

4. Conclusion and Future Prospects

This research concludes that vertical farming can contribute to global food security, but its current limitations—especially energy cost and crop suitability—prevent it from replacing traditional agriculture. The most effective strategy is a hybrid model in which conventional farming operates within natural land capacity while vertical farming supplements production with stable, high-efficiency yields of specific crops.

In the future, advancements in renewable energy, smart-farm technology, and automation may significantly improve the sustainability and profitability of vertical farming. Policymakers, researchers, and industry leaders should collaborate to develop energy-efficient systems and identify regions where vertical farming can offer the greatest benefit. Continued research comparing countries and crop types will be essential for building a resilient global food system.

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Refugee Medical Support and Digital Currency

～Proposal for an International Aid Model Enhancing Transparency and Fairness～

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Abstract

This study focuses on the challenges of efficiency and transparency in financial distribution for refugee medical support and proposes a new assistance model utilizing digital currency. Traditional methods such as cash distribution and bank transfers have suffered from serious issues, including high transfer costs, delays in fund delivery, and misuse of funds, all of which hinder refugees' access to medical care. In response, this research proposes the establishment of a "medical-purpose-only digital currency system."

1. Specifically, the system is built on three key pillars:
2. Mobile wallets or IC cards distributed to each refugee,
3. Token design that allows usage only at certified medical institutions, and
4. Transparent transaction management through blockchain technology.

Through this framework, funds can reach medical services directly, preventing intermediary exploitation and fraudulent use. Moreover, the immutability of transaction records facilitates international auditing and enhances the credibility of donors and aid organizations.

Based on case studies and scenario analyses conducted in Jordan, Kenya, and Bangladesh, the proposed system demonstrates the potential to shorten fund transfer times from several weeks to just a few hours and significantly reduce transaction costs. Furthermore, it was found to improve medical institution utilization rates and to be effective in continuous care such as chronic disease management and maternal and child health.

On the other hand, challenges remain, including underdeveloped infrastructure, differing national regulations, and refugees' limited digital literacy. To overcome these issues, this study proposes three policy priorities:

1. Development of electronic wallets operable even offline,
2. Infrastructure development in refugee camps using renewable energy, and
3. User education programs involving refugees themselves.

In conclusion, the proposed "medical-purpose digital currency system" represents a practical model that can dramatically enhance the efficiency, transparency, and fairness of refugee medical assistance. This study offers a new direction for humanitarian aid and is expected to contribute to future policy formulation and the establishment of international frameworks.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

In recent years, the world has been confronted with severe humanitarian crises. Driven by diverse factors such as armed conflict, persecution, climate change, and extreme poverty, the

number of forcibly displaced people has risen sharply. Many are compelled to cross borders and start new lives as refugees. According to the 2024 report of the United Nations High Commissioner for Refugees (UNHCR), the global forcibly displaced population has surpassed 130 million, of whom approximately 40 million require international protection as refugees. This figure represents the highest in history, highlighting the growing limitations of the international community's support mechanisms.

A large proportion of refugees flee from regions facing political instability or recurring natural disasters, and host countries are required to respond to basic needs including food, water, shelter, education, and healthcare. Among these, medical assistance is a particularly vital area of support, as it is directly linked to the preservation of life. Comprehensive responses are needed for a wide range of health challenges, including infectious disease outbreaks, the exacerbation of chronic illnesses, inadequate conditions for childbirth and childcare, and severe psychological trauma. In reality, however, healthcare systems in refugee settings remain fragile, and many regions lack sufficient access to medical services.

One of the most fundamental challenges in refugee healthcare is a chronic shortage of financial resources. Funds collected by international organizations and NGOs are consistently insufficient, resulting in repeated cases in which necessary medical supplies and personnel cannot be secured. Furthermore, when multiple humanitarian organizations operate in the same region, inadequate information sharing regarding the allocation and use of funds often leads to inefficiency and a lack of transparency—factors that undermine trust in humanitarian operations.

Challenges related to the supply of medical goods and pharmaceuticals are also severe. Many refugee camps and displacement sites are geographically isolated, and poor road infrastructure or political instability frequently hinder the transportation of aid supplies. The situation is especially critical for medicines requiring cold-chain logistics, such as vaccines and antibiotics; disruptions in transportation make it difficult to maintain quality and safety in healthcare delivery.

The shortage of healthcare personnel on the ground further exacerbates these problems. Not only are the numbers of deployed doctors and nurses insufficient for the scale of need, but there is also a critical lack of specialists in areas such as infectious disease control, obstetrics and gynecology, pediatrics, and mental health. This shortage limits the ability to respond to diverse health needs. As a result, vulnerable groups—particularly women, children, and older adults—tend to receive inadequate care, leading to widening health disparities.

At the same time, the circumstances of refugees themselves must be considered in the provision of healthcare. Language barriers, cultural and religious differences, and social stigma associated with refugee status can act as psychological obstacles that deter individuals from seeking medical assistance. Moreover, refugees often lack stable legal status, preventing them from joining national health insurance systems, and forcing some to forgo treatment due to financial constraints.

To address these multifaceted challenges and achieve more effective and sustainable medical support, the application of innovative technologies is gaining attention. In particular, digital currencies based on blockchain technology are considered a promising tool for improving the transparency and immediacy of financial flows, thereby facilitating timely medical provision on the ground. Unlike traditional centralized systems of fund management, blockchain allows real-time monitoring of transactions, helping to prevent corruption and misuse of aid. Additionally, receiving assistance via smartphones enables refugees to select the goods and services they need, contributing to a more dignified model of humanitarian support.

In sum, although refugee medical assistance faces numerous structural challenges, technological advancements offer potential pathways toward improvement. This paper examines how the introduction of digital currency could contribute to resolving these issues and explores how it may help achieve more equitable and efficient healthcare support for refugees.

1-2. Previous Research

In the field of refugee assistance and international humanitarian aid, efforts to utilize digital currencies and blockchain technologies have garnered increasing attention in recent years. Existing studies have predominantly examined their effectiveness from the perspectives of “enhancing transparency,” “reducing costs,” and “promoting financial inclusion.”

First, the World Bank (2022) argues that blockchain technology can improve the transparency of financial flows in international aid, making transactions traceable and thereby reducing opportunities for misuse and lowering intermediary costs. Similarly, Sandner et al. (2021) discuss the potential of central bank digital currencies (CBDCs) to expand financial access for unbanked populations and to promote economic participation, particularly in developing countries. These works highlight the foundational significance of digital currencies in the context of refugee support.

Furthermore, a report by UNHCR (2020) analyzes the introduction of electronic voucher systems in refugee camps. In the Za’atari camp in Jordan, for example, the distribution of electronic vouchers for food and basic necessities has been shown to improve efficiency and transparency compared with traditional cash-based assistance. Likewise, Akinola (2020) demonstrates how the mobile money service M-Pesa in Kenya has advanced financial inclusion and contributed to stabilizing the lives of vulnerable populations. These cases illustrate the potential for digital technologies to function effectively at the field level.

However, much of this existing research focuses on food assistance or general financial aid, and studies specifically addressing applications in the medical sector remain limited. In particular, the perspective of “using digital currency to distribute funds that enable refugees to access healthcare services” has not been sufficiently explored. Consequently, the present

study builds on previous research while extending its application to the critical yet understudied domain of medical assistance.

1-3. Research Question (RQ)

The central questions addressed in this study are as follows:

To what extent can digital currency mitigate the existing challenges in refugee medical assistance—namely the lack of financial transparency, delays in distribution, and increasing intermediary costs?
→ This study examines whether the use of digital currency offers advantages in efficiency and transparency compared with conventional cash transfers and in-kind aid.

How would the introduction of a digital-currency–based "medical voucher system" affect the equity of refugees' access to healthcare services?
→ The analysis evaluates whether such a system can establish a framework that enables refugees to obtain medical services promptly and equitably.

How can challenges associated with implementing such a system—such as limited digital literacy, infrastructural constraints, and coordination with national governments and financial regulations—be overcome?
→ This study identifies key barriers that influence feasibility and explores potential solutions.

Through these research questions, the aim of this study is not merely to assess technological possibilities, but to determine whether a new model of refugee medical assistance utilizing digital currency can be meaningfully developed.

1-4. Hypothesis

This study establishes the following hypotheses:

A medical assistance system utilizing digital currency significantly improves the efficiency and transparency of aid compared with traditional cash transfers and in-kind distribution.
→ By employing technologies such as blockchain, transaction histories and financial flows become traceable, thereby reducing opportunities for misuse and lowering intermediary costs.

The introduction of a digital-currency–based medical voucher system enhances the equity of refugees' access to healthcare services.
→ It is expected that such a system would allow refugees—regardless of their place of residence or affiliation—to receive necessary medical services promptly.

Challenges associated with implementation—such as limited digital literacy, constraints in communication and electricity infrastructure, and issues related to regulation and

intergovernmental coordination—can be overcome through appropriate system design and support mechanisms.

→ Strengthened collaboration among NGOs, international organizations, and local authorities is anticipated to minimize technological and institutional barriers.

By examining these hypotheses, the objective of this study is to determine whether refugee medical assistance supported by digital currency can constitute a more efficient, equitable, and sustainable model.

2. Research Method

To examine the potential of digital currency in refugee medical assistance, this study employed a multi-method analytical approach consisting of the following components:

Literature Review

First, existing research on refugee assistance and digital currency was systematically reviewed. The literature included international reports addressing challenges in refugee healthcare and existing support models (e.g., UNHCR, 2022; WHO, 2021), as well as academic papers on blockchain and digital-currency-based remittance systems (Swan, 2015; Catalini & Gans, 2016). This review provided a basis for identifying the limitations of conventional support mechanisms and the theoretical potential of digital currency adoption.

Case Study Analysis

The study examined ongoing humanitarian projects utilizing digital currency—such as UNHCR's Building Blocks initiative—and analyzed their implementation methods, outcomes, and challenges. Key indicators evaluated included transaction speed, transparency, users' access to healthcare services, and the effects on local infrastructure.

Stakeholder Insights (Based on Reports and Published Interviews)

Reports and interview-based documents produced by local NGOs, international organizations, and medical practitioners were analyzed to extract practical challenges and benefits associated with digital currency implementation. Particular attention was given to strategies addressing limited digital literacy among users and constraints related to communication and electricity infrastructure.

Scenario Analysis

Drawing on the above findings, the study developed multiple scenarios for a digital-currency–enabled medical assistance model. The three scenarios included:

1. a model that supplements existing cash-transfer systems,
2. a model that fully transitions to digital currency, and
3. a hybrid model integrating digital currency with strengthened coordination among local medical institutions.

Each scenario was evaluated in terms of efficiency, transparency, and equity.

Comparative Evaluation

Finally, the study compared traditional support models with those incorporating digital currency to test the hypotheses regarding improvements in efficiency, equity, and sustainability. Evaluation indicators included reductions in transaction costs, improvements in access to medical services, and satisfaction levels among both providers and recipients.

Through this combination of analytical methods, the study aims to provide a concrete and practical assessment of the extent to which the introduction of digital currency can contribute to addressing structural challenges in refugee medical assistance.

3. Results and Discussion

3-1 Results

This study conducted a comparative analysis of existing refugee medical assistance mechanisms and medical support models utilizing digital currency. The results reveal the following three key findings:

(1) Challenges in Managing the Use of Aid Funds

Several international reports indicate that although cash assistance provided by UNHCR and NGOs offers flexibility by allowing recipients to use funds for various needs, a significant portion is often spent on purposes other than medical care. Moreover, mechanisms to verify whether financial support was indeed used for healthcare expenses remain insufficient.

(2) Features and Limitations of Existing Cashless Assistance

Successful cases of cashless assistance—such as Kenya's M-Pesa system and the UN's voucher programs—have demonstrated benefits including faster transactions and improved transparency. However, these initiatives primarily target general living expenses or food assistance, and models specifically tailored to healthcare remain limited.

(3) Challenges Related to Refugees' Access to Healthcare and Agency

Traditional medical assistance provided by international organizations and NGOs tends to involve a passive service-delivery model in which refugees receive predetermined medical care. The literature highlights common concerns regarding insufficient access to healthcare and limited agency among refugees in choosing services that match their needs.

Furthermore, analysis of existing projects such as UNHCR's Building Blocks indicates that blockchain technology is effective in enhancing transaction transparency and improving record management for both donors and beneficiaries.

3-2 Discussion

Based on the above findings, it can be argued that a medical assistance model utilizing digital currency has the potential to compensate for the limitations of conventional support systems.

(1) Ensuring the Direct Allocation of Funds to Medical Expenses

By introducing a form of digital currency restricted solely to medical purposes, it becomes possible to construct a system in which financial aid is reliably spent on consultation fees and medication costs. This aligns with the importance of targeted assistance frequently emphasized in international literature.

(2) Novelty of a Healthcare-Specific Cashless Support System

Whereas existing cashless assistance programs have largely focused on general living support, the model proposed in this study is distinctive in its specialization in healthcare. Given that inadequate access to medical services is consistently identified in the literature as one of the most critical challenges refugees face, a model that directly addresses this issue possesses strong potential effectiveness.

(3) Qualitative Benefits in Enhancing Refugee Agency

Allowing refugees to select healthcare providers using digital currency may shift support dynamics from “passive provision” to “active choice.” This aligns with the concept of empowerment, which is widely emphasized in international research as a key component of sustainable humanitarian assistance.

(4) Integrability with Existing Frameworks for International Cooperation

Cash-based transfers and voucher systems already implemented by international organizations can be augmented through collaboration with fintech firms that offer blockchain technologies. Such integration can further enhance transparency and efficiency, demonstrating that innovative approaches can be achieved not by constructing entirely new systems but by incorporating advanced technologies into existing frameworks.

(5) Positioning of the Proposed Model

Taken together, these considerations suggest that the proposed model is not merely a supplementary mechanism to existing support structures, but rather a distinct framework specialized in medical assistance. Its anticipated improvements in efficiency, transparency, and equity indicate that it has significant potential to contribute to qualitative advancements in refugee healthcare support.

4. Conclusion and Future Prospects

This study reached an overall affirmative conclusion regarding the research question: “To

what extent can digital currency overcome the existing challenges in refugee medical aid and contribute to sustainable and equitable support?" Findings from the literature review and case analyses indicate that the proposed model demonstrates clear advantages over conventional aid schemes in four key areas: (1) greater transparency in the use of funds; (2) more direct and efficient payment of medical expenses; (3) enhanced autonomy for refugees; and (4) compatibility with existing international cooperation frameworks.

These findings suggest that the proposed introduction of a digital currency restricted to medical use is not merely a theoretical construct, but a model that can be realistically implemented based on current technologies and institutional systems. Furthermore, by enabling refugees to select their own medical services, the system has the potential to shift humanitarian assistance from a passive to an active form of support, thereby contributing to the realization of empowerment—one of the core principles of refugee assistance.

At the same time, this study also identified several implementation challenges, including insufficient communication infrastructure, disparities in digital literacy, and the complexity of regulatory coordination among states. Addressing these obstacles will require phased pilot projects, educational and outreach programs for users, and rule-making led by international organizations.

Looking ahead, it will be essential to conduct small-scale pilot programs in selected regions or camps to assess cost-effectiveness and user acceptance. Based on the outcomes of these trials, the scope of digital-currency-based assistance could gradually expand from medical aid to education, basic living support, and employment assistance, ultimately contributing to a comprehensive model that enhances the overall sustainability of refugee support.

In conclusion, the proposal presented in this study offers not merely a supplement to existing frameworks but a novel model for refugee medical assistance with distinct value. Future efforts should focus on integrating this proposal into policy and practice through the combined efforts of the international community and technological innovation, thereby contributing to the realization of sustainable and equitable refugee medical support.

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Water Cycles and Sponge Cities

~Focus on the material~

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Abstract

I became interested in the issue of floods caused by climate change, so I researched efforts to reduce the damage they cause. My research showed that an urban planning approach called “sponge cities” can be effective. Therefore, I investigated what kinds of materials, structures, and locations are suitable for this method. Based on academic papers from developing countries and online sources, I considered how to use sponge-city concepts in the most effective way to reduce flood damage.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

In 2023, many large-scale floods occurred around the world, including in Libya, China, and several African countries. These floods caused countless deaths and missing people, and they also led to worsening sanitation and a higher risk of infectious diseases.

A major factor behind the recent increase in floods is the rise in global temperatures caused by global warming. Although countries are working to slow climate change, I believe it is almost impossible to stop it completely.

Because of this, I believe that the damage caused by floods will continue to increase in the future, and I began to wonder how we could reduce the number of floods.

1-2. Previous Research

When I searched online, I found that many flood-control measures focus on “hard” infrastructure, such as building levees, dams, and retention basins. I also learned that there are several preparations individuals can make, such as raising houses on stilts or keeping sandbags ready.

However, as expected, I found that in order to fundamentally reduce floods, we must make progress in slowing global warming.

1-3. Research Question (RQ)

Based on the previous research above, I concluded that my original question could not be realistically solved because the issue is too large in scale.

Therefore, I set my research question as: “How can we reduce the damage caused by floods?”

1-4. Hypothesis

As a result of my research, I learned about an urban planning approach called “sponge cities.” I will examine sponge cities in more detail later, but I believe that making effective use of this approach is the best solution.

2. Research Method

First, I will research successful cases in which flood damage was reduced, using the internet and academic papers. (Through my research, I found successful cases in China, Denmark, Los Angeles, and the Netherlands. Therefore, I decided to examine the factors behind their success in more detail.) I will then summarize the results in one paper and ask a university student for advice on future research. Based on the advice I receive, I will reconsider how to proceed with my research.

3. Results and Discussion

3-1 Results（結果）

When I researched efforts to minimize flood damage using academic papers, I found an urban planning approach called “sponge cities.” I believed that making effective use of this approach would be the best solution, so I decided to further investigate sponge cities.

A sponge city is an urban development concept in which the ground surface of a city can store water like a “sponge,” protecting the city from heavy rainfall and creating a cooling effect when water evaporates from the soil during hot periods. By strengthening urban planning and development management, buildings, roads, green spaces, water systems, and other ecosystems can naturally store, absorb, retain, and treat rainwater, allowing it to circulate effectively.

This approach has recently been implemented more actively, especially in large cities. It is also expected to help cities coexist with materials such as asphalt and concrete, which are considered major causes of the “urban heat island effect,” where city temperatures are higher than those in surrounding suburban areas.

As I continued my research, I found successful examples of sponge cities in China, Denmark, Los Angeles, and the Netherlands.

When I examined the factors behind the success in the four countries, I found several common points among them. For example, the materials widely used in cities were different from those in traditional urban areas. In conventional cities, development has mainly relied on impermeable materials such as concrete and asphalt.

For example, in China, the concept of sponge cities has been introduced with the goals of reducing water runoff, improving water quality, and lowering greenhouse gas emissions. The Chinese government has stated that “through this implementation, about 70% of

rainwater has been recycled," and it aims to make around 80% of urban areas into sponge cities by 2030.

3-2 Discussion（考察）

From the literature review, I found that traditional cities have mainly relied on impermeable materials such as asphalt and concrete that repel water. In contrast, cities where sponge city planning has been successful tend to use materials such as porous concrete and bricks.

In natural environments, rainwater seeps into the soil, is absorbed by plant roots, and then slowly flows into rivers, creating a natural water cycle. I believe that the essence of sponge cities is to reproduce this process using urban materials and to incorporate the natural water cycle into urban structures.

Therefore, it is necessary to introduce green spaces and permeable pavement into cities covered with concrete in order to promote water circulation. In Pittsburgh, for example, permeable pavement made of concrete bricks has been implemented. By filling the small gaps between the concrete blocks with crushed stones, water can pass through the surface. This type of pavement can be used even in places where plants cannot be grown, such as alleys and parking lots, making it a highly effective solution.

4. Conclusion and Future Prospects

I found that one approach to minimizing flood damage is the concept of "sponge cities," and I believe that its essence lies in incorporating the natural water cycle into urban structures.

Therefore, it is necessary to introduce green spaces and permeable pavement into cities covered with concrete in order to promote water circulation. In Pittsburgh, for example, permeable pavement made of concrete bricks has been implemented. By filling the small gaps between the concrete blocks with crushed stones, water can pass through the surface.

This type of pavement can be used even in places where plants cannot be grown, such as alleys and parking lots, making it a highly effective solution.

However, replacing the large amount of existing concrete in cities requires significant labor and cost, which makes it difficult to adopt in developing countries, and this remains a challenge.

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Linguistic Justice in Scientific Research ～Should We Make ENGLISH UTOPIA?～

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ABSTRACT

The difference of language has an extreme influence on the progress of study on science. The trend is apparent if you take a look at the data of the number of scientific publishing and the rate of publishing-used languages. This report of 2 years study reveals the impact of uni-language promotion on academic study of science. The analysis of recent situations and investigation were connected to the consideration of whether ENGLISH UTOPIA is appropriate or not. In consequence, it was concluded that disparities exist, the difference of language can be a portion of the reason, and there can be some troubles when ENGLISH UTOPIA comes true.

1. Introduction (Background, Significance, Objective)

1－1 Social Trends (Current Situation and Problems)

With the influence of information technology, international exchange is becoming more and more active today. The same is true for scientific research activities. However, when comparing the number of academic publications, it is found that there are significant differences between regions. Considering the number of academic publications to represent the progress of research, this can be interpreted as a difference in the level of research between regions. Differences in research levels are related to the amount of research results that citizens can make use of, which is thought to ultimately affect the development of the region.

As it was mentioned above, when I wondered why such disparities have arisen in the midst of the advancement of information technology, cultural differences came to mind. Among them, I focused on language differences. When I investigated whether language differences were a barrier to research activities, the existence of a language barrier became clear. Researchers who are not proficient in English take 91% longer to read papers than those who use English as their primary language[1]. In addition, it was found that approximately 70% of the papers were written in English. These data show that there is a considerable gap between English-speaking researchers and non-English-speaking researchers alone.

It was therefore thought that language differences might be a "barrier" preventing active exchange of research activities in the field of science.

Based on the above, I thought that active exchange with other countries and equalizing research standards would be effective in raising living standards and further development around the world, and I felt that cultural differences such as language differences were an issue, which led me to conduct research to improve the current situation.

[1] NIKKEI Asia “Nonnative English researchers take 91% longer in reading: study”

1－2 **Previous Research**

According to **Scientific publishing in developing countries: Challenges for the future**[2],

Recent initiatives
Is it then at all possible for the developing countries to get integrated into the 'Global (rich persons') Research Village' or is it an illusion, a utopia? Let us be realistic. Full integration is at best a long way off if it can ever happen, but this does not mean that we should abandon all hope and refrain from doing something about the situation I have described above. It could be argued that without utopia, there would be no history, and that, without utopia, we would still be living in.
Challenges for the future
I believe that further progress could be made if there were a universal will to undertake certain steps. By universal I mean a will that would involve not only scientists worldwide (those from developed as well as those from developing countries) but also governments, international associations, organizations, aid agencies, etc. Let us now consider some short-term challenges.

In this study, it is mentioned whether we should make true 'Global (rich persons') Research Village' , of course it is not or cannot be a conclusion of that study, this view seemed to be meaningful and innovative. Getting inspiration from these words, the writer decided to study "ENGLISH UTOPIA[3]", which means 'Global (rich persons') Research Village.', the research organization with a uni-language.

1－3 **Research Question**

The core question of this research is " Is 'ENGLISH UTOPIANIZATION' effective for all scientists to destroy barriers to join scientific communities? If it is not, what is the best?" In addition to it, there are some other research questions which makes analysis and conclusion more.

The research question for the first year was "Are language differences a barrier to participation in the scientific community?", and a thorough analysis of the current situation was conducted. The research question for the second year was "Can language unification resolve the barriers to participation in the scientific community?" Through these research questions, we ultimately hope to answer the following research question: "Is English utopianization effective in reducing the barriers to participation in the scientific community, and if not, what are the alternatives?"

1－4 **Hypothethis**

English utopianization leads to the devaluation of languages other than English, and leads to the elimination of ethnic dignity. Furthermore, the cost and time required for English utopianization would be

[2] ScienceDirect Françoise Salager-Meyer
[3] In this study, we define "ENGLISH UTOPIA" as a state in which English is used as the primary language in research institutions in all countries of the world, and all academic publishing is unified into English. "ENGLISH UTOPIANIZATION" means creating a state in which all research languages in the world are unified into English, in other words, creating an "ENGLISH UTOPIA."

enormous, and it would not be profitable if you take into account the halt to research development during that period and the use of research budgets for English education. Furthermore, in the process, a gap in research could emerge between countries that use English and those that do not, which could be counterproductive. Given these risks, English utopianization should not be effective. Better alternatives need further examination.

2. **Method of Research**

Firstly, we will analyze the current situation to answer research question 1: "Are language differences a barrier to participation in the scientific community?". Reference data used will include the number of researchers in each country, the number of academic publications in each region of the world, the percentage of languages used in papers, and languages used by countries around the world. We will also refer to previous research such as "The manifold costs of being a non-native English speaker in science" to consider the various costs of having a non-native English speaker in science. Based on the above results, after concluding Research Question 1 (“Is language difference a barrier to participation in the scientific community?”), we will collect data and examine Research Question 2 (“Can unifying language resolve barriers to participation in the scientific community?”). Here, we will focus on issues of linguistic value and the costs associated with an English utopia, advancing our examination from philosophical and other perspectives, while also planning simulations using quantum annealing.

Ultimately, we will conclude on Research Question 2: “Can language unification resolve barriers to participation in the scientific community?” Based on the results of Research Questions 1 and 2, we will then address the core research question for the entire study: “Is English utopianization effective for reducing barriers to participation in the scientific community? If not, what are the alternatives?”

3. **Research Findings and Discussion**

First, we examined the number of academic publications in each region of the world (Figure 1: right panel). Figure 1 shows significant differences in academic publication numbers across regions. Specifically, Western countries have a very high number of academic publications. In contrast, regions with fewer academic publications were Asia, Africa, and South America.

Figure 1

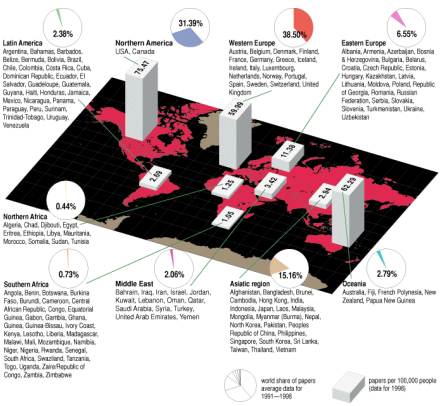
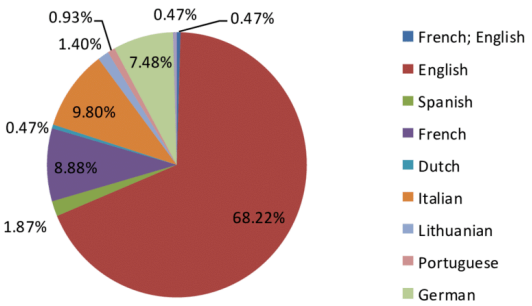


Figure 2

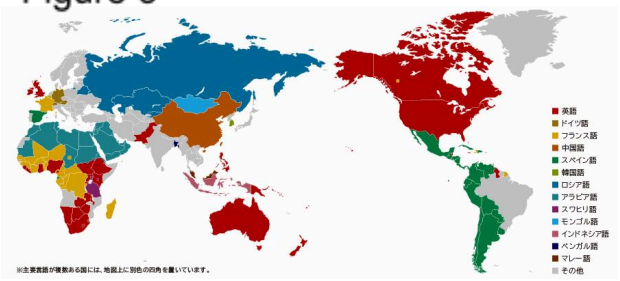


This data reveals that disparities exist in science research across regions due to various factors.[4]

Next, we examined the proportion of languages used in research papers worldwide (Figure 2: Left). This data reveals that approximately 70% of research papers are written in English.

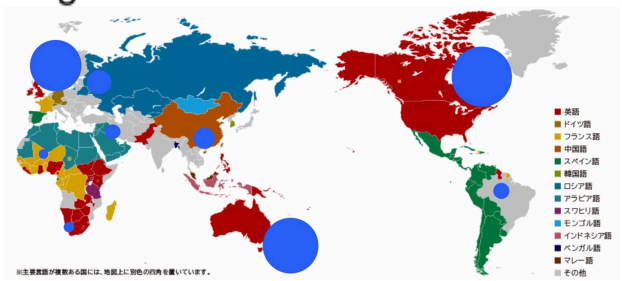
Among other languages, Italian accounts for 9.80% and French for 8.88%, clearly showing that English holds a very high proportion.

Figure 3



Next, Figure 3 (left) shows data summarizing the major languages of each country.

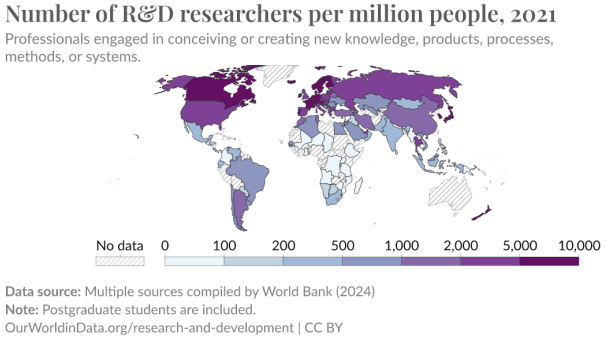
Figure 4



Based on this data, Figure 4 combines the information from Figures 1 and 3. This data reveals that the number of academic publications is higher in English-speaking regions.

Furthermore, the number of researchers per million people (Figure 5) also shows a certain degree of correlation with the academic publication numbers in Figure 1.

Figure 5



The information gathered so far confirms that there are disparities in research activity across the global scientific community, and language plays a part in causing these differences.

[4] In this study, we have chosen to consider the “degree of development in scientific research” using “the number of academic publications” as an indicator.

Next, we focus on each individual researcher to analyze the current situation.

Figure 6AB shows that researchers whose first language is not English spend twice as much time reading English research papers as researchers whose first language is English spend reading English papers. On the other hand, the time such researchers spend reading papers in their own first language is not significantly different from the time researchers whose first language is English spend reading papers in English. Other data also revealed various disparities between researchers whose first language is English and those whose first language is not English.

Figure 6

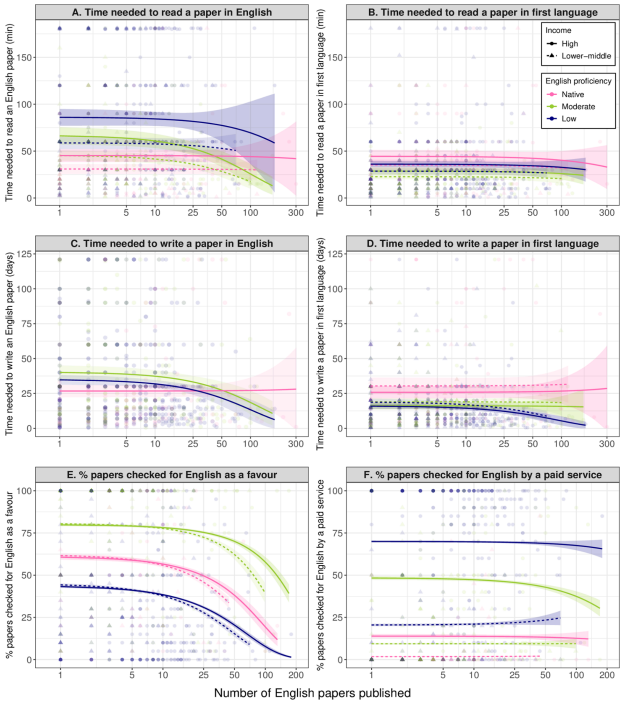


Figure 7

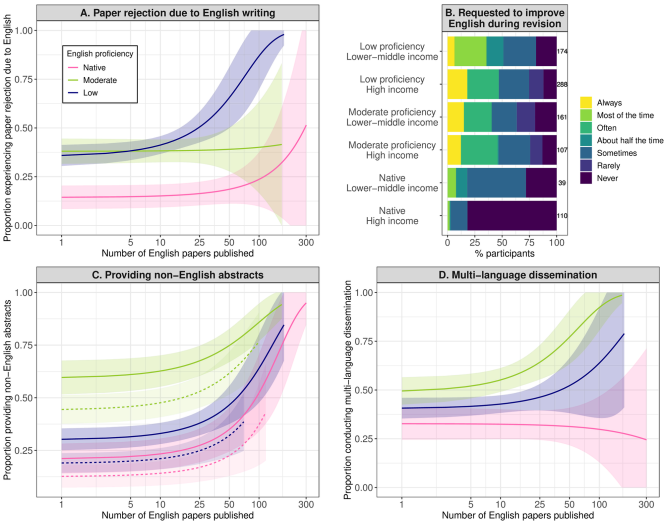


Figure 8

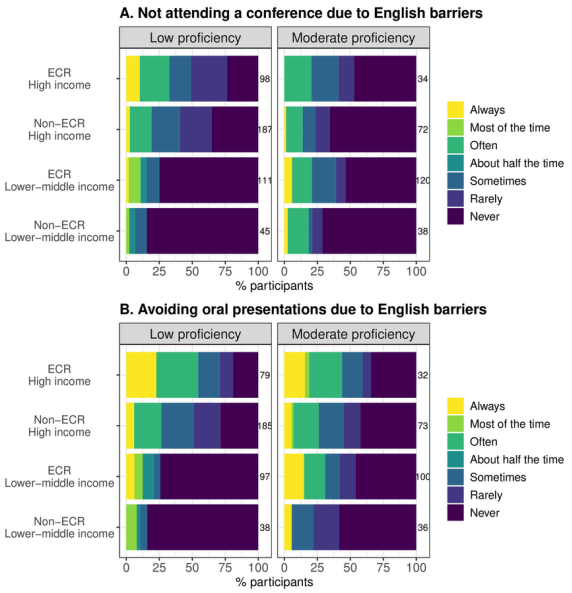


Figure 7A shows that the number of papers rejected due to issues with English writing is overwhelmingly higher for researchers whose first language is not English than for those whose first language is English. Furthermore, Figure 8A reveals that language barriers also create obstacles to participating in academic conferences, highlighting the current reality where English use is almost universally required. Thus, it is evident that language differences, particularly the distinction between English and non-English, exert various detrimental effects in the research arena and constitute a factor hindering the participation of researchers whose first language is not English in the research community.

Therefore, the answer to Research Question 1, “Is language difference a barrier to participation in the scientific community?”, is concluded to be “YES”.

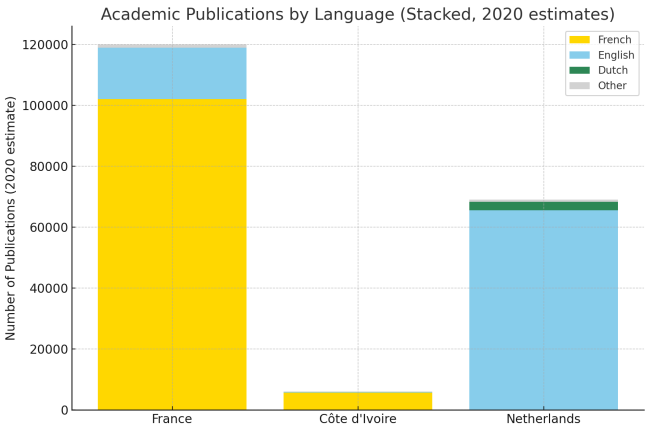
Philosophical Approach

Next, we turn to examining Research Question 2: “Can language unification resolve barriers to participation in the scientific community?” The key points of contention here are “time and financial feasibility” and “language value issues.” The first year of research will address “language value issues.”

According to When Japanese Dies Out: In the Century of English[5], the English utopianization process establishes English as a “universal language” and relegates other “native languages” to “local languages.” This creates a value hierarchy between English and other languages, potentially leading to the elimination of other languages. From this, we understand that English utopianization risks diminishing the value of languages other than English.

According to Emil Cioran[6], “People do not live in countries. They live in languages. The ‘language’ is our ‘homeland’.” Taking a philosophical approach is essential when aiming to resolve sensitive issues concerning people's inner values, such as the value of language. From Cioran's statement, we understand that excluding languages other than English from the scientific world now amounts to denying the culture of that country itself. The development of scientific fields and the act of ranking and denying people's cultures cannot be easily compared; indeed, from a philosophical standpoint, it is almost certainly a “NO.”

Figure 9



Cost Simulation

Model: The Netherlands

The Netherlands’s government promoted English education for high school students and university students. Though Dutch is largely used in the Netherlands, the most major language in scientific research is English. This is why the language which is used in scientific publishing in the Netherlands is English.

Persona definition: model

[5] Mizumura Minae 「Nihongo-ga-horoirutoki-Eigo-no-seiki-no-nakade」Chikuma Shobo 2015
[6] Romanian writer and thinker 1911-1995

Persona	Model Country	Language	Number of publications	Number of Researchers	FTE[7]
A	France	French	120,000	400,000～430,000	308,000
B	Cote d'Ivoire	French	8,000	6,000～10,000	3,000～3,500
C	The Netherlands	Dutch	69,000	110,000～125,000	90,000～95,000

Native English speaker requires 600-750 hours to master French. Linguistic distance is essentially symmetrical in both directions. Therefore, learning English as a French speaker has the same level of difficulty as the reverse.

Persona	Number of Researchers	Cost(Time to master English)	Loss FTE (FTE per year)[8]
A	400,000~430,000	240,000,000~322,500,000	115,385~155,048
B	6,000~10,000	3,600,000~7,500,000	1,731~3,606

From this simulation, persona A, which has a large research scale, requires much more cost than the other. This implies that the cost of English Utopianization of countries which have a lot of researchers may well be a heavy burden. Whereas, for persona B, English Utopianization may be an effective solution for breaking a barrier of language in scientific research.

4. **Conclusion and Future Prospects**

The first-year goal was the research question: "Are language differences barriers to participation in the scientific community?" From "3. Research Findings and Discussion," a macro-level analysis revealed differences in academic publication numbers across regions, and these differences were found to be significantly related to language. Furthermore, focusing on individual researchers from a micro perspective revealed various disparities between researchers whose first language is English and those for whom it is not, including differences in time investment and the credibility of their papers[9]. Considering these analyses, we concluded that "language differences can be considered a barrier to participation in the scientific community" in response to this research question.

Subsequently, research proceeded to seek conclusions for the second-year research question: "Can language unification resolve barriers to participation in the scientific community?" The key points were

[7] FTE is a measure that converts the amount of time people spend on research into the equivalent number of full-time researchers: Someone working full-time on research → 1.0 FTE, someone spending half of their time on research → 0.5 FTE. It shows "how much research work is actually being done," not how many researchers exist.
[8] Using 2,080 hours as the annual working time of one full-time researcher, the total FTE is divided by 2,080 hours. This serves as an indicator of the total loss in researcher-years caused by the time researchers must spend on non-research activities.
[9] From figure 7 "paper rejection due to English writing"

“time and financial feasibility” and “language value issues,” with the first-year research addressing “language value issues.” For sensitive issues like language value, we adopted a philosophical approach. Since English utopianism could lead to the negation of languages or cultures other than English, it was concluded that “from the perspective of language value issues, English utopianism is not effective.”

The main topic of second-year research is to focus on “linguistic justice” and “time and financial feasibility”, and conduct a thorough examination of the merits of English utopianization. Firstly, according to the philosophical approach, it is concluded that English Utopianization may well infringe linguistic justice. Even if English Utopianization is an effective solution for this problem, the value of language should not be ignored because that is what language, as a culture, is all about. Secondly, according to the model simulation of persona A and B, it is revealed that English Utopianization may well make an enormous loss in scientific research of countries which have a large number of scientists, even though it may have a good impact on other countries.

While English utopianization is unrealistic from the perspective of linguistic value, considering the cost-effectiveness in terms of time, financial burden, and the potential for saving lives through technological advancement, it may not necessarily be negative. To verify this possibility, we plan to utilize quantum annealing[10]. Based on these results, we will draw conclusions for the research question “Can language unification resolve barriers to participation in the scientific community?” Furthermore, incorporating the conclusions from these two research questions, we aim to conclude the core research question of this study: “Is English utopianization effective for reducing barriers to participation in the scientific community? If not, what are the alternatives?”

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Sincerely gratitude and respect to the authors, researchers, all those involved, and those who helped me with this research.

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The Socioeconomic Impact of the Space Industry in Africa: Employment,Innovation,and SocialDevelopment

5421 Nagumo Hiroki

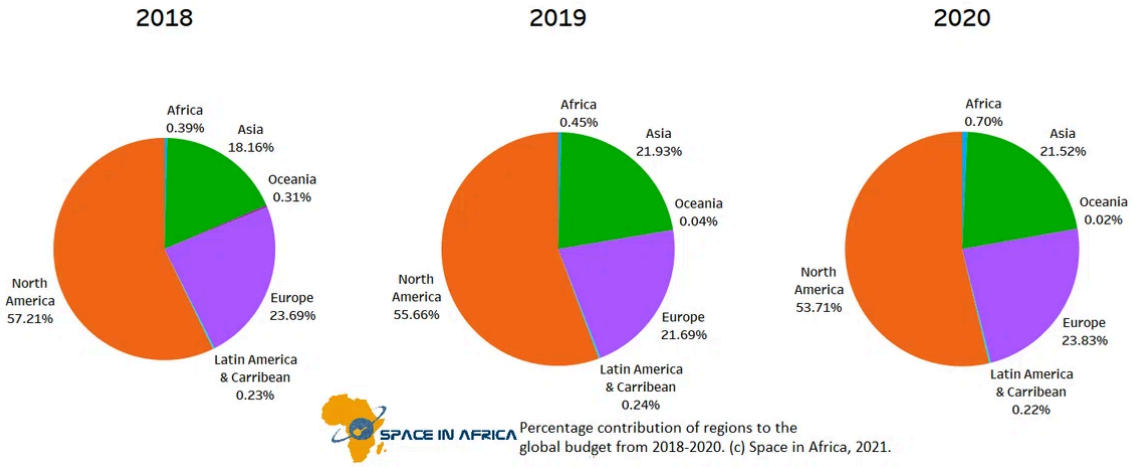
1. Abstract

Last year, I researched what we should do to improve the space industry in Africa. During researching this question, I noticed that clarifying problems and merit is necessary. So I started this research.

It examines how the development of the space industry influences employment and social systems in Africa. By analyzing reports from international space organizations and case studies from countries such as Nigeria and South Africa, this study evaluates how the space sector creates jobs, supports communication infrastructure, and contributes to sustainable development. The findings suggest that the space industry has strong potential to improve economic stability and social welfare in Africa. This research proposes that increased investment in technological education and cross-border cooperation will further accelerate Africa's space development.

2. Introduction

In recent years, many countries have improved their space industry. According to the Space in Africa report, the value of the world space industry in 2021 was 2.5 trillion yen , which is approximately twice the size of Japan's space industry market. Furthermore, by 2026, Africa's space industry is expected to grow by 16% to reach 2.9trillion yen. Although Africa's space sector has achieved significant growth in recent years, it still accounts for less than 1% of the global market, and most satellite launches rely heavily on assistance from foreign countries.



Percentage contribution of regions to the global budget from 2018-2020. (c) Space in Africa, 2021.

Also, I try to find ways of improving the space industry in Africa.Many countries have been developing satellites , launch facilities , and space-related education programs.Some African countries , Egypt, republic of south africa, try to the space industry. However, most African countries can not have the ability to launch and

make satellites. It will become a disability in other developed countries. So, improving the space industry is important.

3. RQ(Research Question)

How does the growth of the space industry in Africa influence employment creation, social infrastructure, and technological development?

4. Methodology

Research survey: Collecting existing data on African space development.
Data analysis: Using public statistics, especially job numbers, GDP influence, and satellite usage.
Literature review: Reading overseas papers, including ESA reports, World Bank publications, and “The Macroeconomic Spillovers from Space Activity.” ChatGPT was used to organize and summarize information for deeper understanding.

5. Results and Discussion

5.1 Growth of Employment

Research indicates that the number of space-related jobs in Africa has been increasing. Satellite development, data analysis, and remote sensing applications have created new positions for engineers, programmers, and communication specialists.

5.2 Satellite Contributions to Social Issues

Satellite technology helps solve several key challenges:

・Agriculture: Monitoring crop conditions improves food production.
・Climate and environment: Observing weather patterns helps predict natural hazards.
・Medical care: Telemedicine becomes possible in remote areas.
・Education: Satellite internet expands access to digital learning.

5.3 Impact on Low-GDP Countries

Sources from the World Bank show that even countries with low GDP can experience significant improvement by investing in space technologies, because satellite data dramatically increases efficiency in industries such as farming and logistics.Moreover, according to “The macroeconomic spillovers from space activity”, space industry increase GDP development and spread any other kinds of

industry.Also, space industry will become fundamental inflammation for Low-GDP Countries.It will be like smartphone , the way of leapfrogging existing inflammation.

6. Conclusion

Based on the research, Africa's space industry has the potential to stimulate both economic and social development. The industry does not only create high-skill jobs but also supports essential services that improve quality of life.

One important factor is innovation. African countries are not simply importing technology; they are building new systems that respond to local challenges. Another key factor is collaboration between governments, universities, and foreign private companies. These partnerships accelerate technical education and introduce new expertise.

The space industry in Africa is still in its early stages, but its potential impact is enormous. It can:

・Create new employment and technical skills

・Support agriculture, education, communication, and disaster response

・Contribute to sustainable social and economic growth

To accelerate this progress, African nations should invest more in technological education and strengthen international cooperation. With the right strategies, the space industry can become one of the most powerful tools for Africa's development.

7. Quotation

・Space in Africa　https://spaceinafrica.com/reports/

・SpaceWatch.GLOBAL
https://spacewatch.global/2024/10/africas-space-industry-valued-at-usd-22-64-billion/

・The macroeconomic spillovers from space activity

https://www.pnas.org/doi/10.1073/pnas.2221342120

How to eliminate gender gap in soccer

Implicit Bias Against Women's Soccer

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Abstract （研究の概要）

This study aimed to clarify why women's soccer tends to be evaluated more negatively than men's soccer, focusing not on differences in ability but on people's unconscious biases. By analyzing previous studies and the histories of professional leagues in various countries, it demonstrated that evaluations of women's soccer have been shaped by social perceptions and a lack of media exposure. Furthermore, the study examined ways to deepen understanding of women's soccer and discussed the possibility that increased information dissemination and expanded opportunities to watch matches could help reduce such biases.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

There is a clear gap in pay and treatment between women's soccer and men's soccer. For example, in international competitions, prize money for men's tournaments is often much higher than that for women's tournaments. This leads to differences in payment for national team players and in team budgets. At the professional club level, female players generally earn lower salaries than male players. In addition, because there are fewer full-time contracts, some players are forced to have second jobs. Differences can also be seen in facilities. Men's teams are more likely to be given better training grounds, equipment, and medical support. In terms of travel and accommodation, men's teams often use private transportation and stay in single rooms, while women's teams may have to travel overnight or share rooms. Moreover, differences in media coverage and sponsorship income increase the gap in revenue, which affects the number of spectators and broadcasting income. These problems are not limited to pay differences. They also have negative effects on players' training environment, career development, and the growth of women's soccer. The purpose of this study is to explain why such differences exist between women's and men's soccer and to consider possible solutions.

1-2. Previous Research

This paper examines whether information about a player's gender affects how people evaluate the quality of professional soccer performance. The authors conducted an experiment in which participants watched video clips of professional soccer plays performed by both male and female players. Some participants watched the original videos, in which the players' gender could be identified, while others watched edited videos in which the players' gender was difficult to recognize. By comparing the evaluations given under these different conditions, the study aimed to identify the influence of gender information on perceived performance quality. The results of the experiment show that when participants could recognize the players' gender, the performances by male players were rated higher than those by female players. However, when the gender information was hidden, the difference in evaluations between men's and women's soccer almost disappeared. This finding suggests

that the lower evaluation of women's soccer is not mainly caused by the actual quality of play, but rather by gender-based stereotypes and unconscious bias held by viewers. In other words, people may judge women's soccer more negatively simply because it is labeled as "women's," not because it is objectively worse. Despite its important findings, this study has several limitations. First, the method used to hide gender information involved blurring the videos, which may have reduced not only gender cues but also details of movement and speed. This means that the experiment may not have completely isolated the effect of gender alone. Second, the evaluation was based on short video clips, which may not reflect how people watch and judge full matches in real-life settings such as stadiums or television broadcasts. Third, the participants' backgrounds, including their nationality, gender, and experience with soccer, may have influenced the results, making it difficult to apply the findings to all audiences. Nevertheless, this research is very useful for my own study on gender inequality in soccer. It provides strong evidence that the gap between men's and women's soccer is partly created by social perceptions rather than actual differences in ability. Based on this study, I can argue that increasing accurate information about women's soccer and improving media representation are important steps toward reducing gender bias. By changing how women's soccer is presented and discussed, it may be possible to improve public evaluation, increase audience interest, and ultimately reduce gender inequality in the sport.

1-3. Research Question (RQ)

How can unconscious bias against women's soccer be eliminated?

1-4. Hypothesis

I believe that the idea that soccer is a sport for men leads to prejudice against women's soccer. For example, in Japan, the men's professional soccer league, the J League, was established in 1993, while the women's professional league, the WE League, was not created until 2021. Similarly, in England, the men's professional soccer league was founded in 1888, whereas the women's professional league was established much later, in 2011. From these facts, it can be inferred that soccer has long been seen as a men's sport. In addition, since women's professional leagues were created only in recent years, they are still unfamiliar to many people. Therefore, in order to eliminate this perception, it is important to help more people learn about and become familiar with women's soccer.

3-2 Discussion（考察）

The most effective way to increase public awareness of women's soccer is to expand media exposure. By using television, online news, and social media, it is possible to communicate

not only match results but also the appeal of the play, the efforts of the players, and the tactical aspects of the game. This helps people perceive women's soccer as something familiar and accessible. In particular, social media is highly effective because short videos and highlights can reach a large audience and engage people who previously had little interest in women's soccer. As opportunities to watch actual matches increase, even those who hold the preconceived notion that "women's soccer is low in quality" are more likely to recognize its value and appeal as a competitive sport. In addition, increasing opportunities to encounter women's soccer through school education and community events is another important approach. Physical education classes, lectures, and local match-viewing events can create environments in which children and young people naturally become familiar with women's soccer. By being exposed to women's soccer from a young age, it is expected that they will grow up without the fixed idea that "soccer is a sport for men." Furthermore, opportunities to interact directly with players can deepen understanding of the sport and foster a desire to support women's soccer. In this way, combining media outreach with educational and community-based activities can broaden recognition and understanding of women's soccer and help reduce unconscious bias toward the sport.

4. Conclusion and Future Prospects

One of the most significant challenges for the future is that the environment surrounding women's soccer remains embedded in a male-centered structure. Gender disparities persist in areas such as media coverage, sponsorship support, and player development systems, and these differences hinder the growth of women's soccer. To improve this situation, it is necessary not to rely on short-term publicity, but to establish mechanisms that continuously highlight and support women's soccer across society as a whole. In addition, it is an important task to promote the perspective that women's soccer should not be treated as a "special" category, but should be evaluated fairly as one field of sport.

The message that should be conveyed to the world is that women's soccer is by no means a substitute for men's soccer, but a sport with equal value and appeal. Society should move toward evaluating quality of play, effort, and passion on their own merits, rather than through gender-based stereotypes. Expanding understanding and interest in women's soccer will enhance diversity and fairness throughout the sports world and contribute to a richer and more inclusive future.

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Enhancing Income and Sustainability for West African Cocoa Farmers

～Integrating Fairtrade, Traceability, and ICT～

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Abstract

This study investigates how fairtrade certification, supply chain traceability, and ICT can jointly enhance income and environmental sustainability for cocoa farmers in West Africa. Using reports, academic studies, and policy documents, it compares single and combined approaches, such as certification with digital traceability or farmer support tools. The analysis shows that institutional factors like government pricing, the Living Income Differential (LID), and EU sustainability rules greatly influence outcomes. The paper concludes that stronger cooperatives, transparent premium distribution, and expanded digital payment and information systems are key to building a fair and sustainable cocoa value chain.

1. Introduction

The cocoa sector in West Africa underpins global chocolate consumption, yet many smallholder farmers remain in persistent poverty despite rising ethical concerns among consumers. This research addresses the gap between global sustainability discourses and farmers' lived realities by asking how certification, transparency, and ICT can be combined to deliver more equitable outcomes. The purpose is to clarify which institutional and technological arrangements enable cocoa farmers to secure a living income while reducing environmental and social risks in the supply chain.

1-1. Social Context

In major cocoa-producing countries such as Côte d'Ivoire and Ghana, farmers face structurally low farm-gate prices, volatile markets, and power imbalances with exporters and multinational chocolate companies. Problems such as child labor, deforestation, and opaque buying practices persist, partly because farmers have limited bargaining power and poor access to reliable market information. At the same time, international buyers and consumers increasingly demand sustainable and traceable cocoa, creating both pressure and opportunity for systemic change in the region.

1-2. Previous Research

Previous studies on fairtrade and other certification schemes suggest that price premiums and long-term contracts can improve farmers' income, but outcomes vary widely depending on cooperative capacity and national policy frameworks. Research on traceability and transparency shows that digital monitoring systems can limit side-selling and reduce opportunities for unfair middlemen practices, yet implementation costs and infrastructure gaps remain serious challenges. Studies on ICT-based extension services highlight the potential of mobile phones and digital platforms to improve farmers' knowledge and decision-making, but also underline that technology alone cannot overcome weak governance or unequal power relations.

1-3. Research Question

The central research question is: How can fairtrade certification, supply chain traceability, and ICT be combined to improve income and sustainability outcomes for cocoa farmers in West Africa? This question emerges from the observation that single instruments—such as certification alone—often fail to deliver stable and sufficient income under existing market and policy constraints. By focusing on the interaction between institutional conditions (e.g., LID, national pricing systems) and technological tools, the study seeks to identify realistic pathways for more equitable value distribution along the cocoa supply chain.

1-4. Hypothesis

The hypothesis is that a multi-intervention approach—combining fairtrade certification, digital traceability, ICT-based services, and cooperative capacity building—will be more effective in improving farmers' income and sustainability than certification alone. This expectation is based on evidence that transparent premium management, direct digital payments, and timely market information can reduce opportunities for elite capture and price manipulation within cooperatives and local trading networks. The study also hypothesizes that alignment with international sustainability regulations and strong farmer organizations will be crucial conditions for such interventions to generate lasting, inclusive benefits.

2. Research Method

The research adopts a qualitative comparative design centered on a structured literature review of reports, policy documents, and academic articles on cocoa, fairtrade, traceability, and ICT in West Africa. First, the study synthesizes evidence on income effects, governance challenges, and sustainability outcomes of existing certification and digital initiatives. Second, it compares different intervention models (e.g., certification-only, certification plus ICT, traceability-focused projects) with reference to cost-effectiveness, institutional feasibility, and distributional impacts. Finally, it analyzes the role of national pricing systems, the LID, and emerging EU due diligence and deforestation regulations to assess how global and local governance shape the success of these interventions.

3. Results and Discussion

3-1 Results（結果）

The review shows that fairtrade and similar certification schemes can increase average farm income when cooperatives are well managed and price premiums are transparently distributed, but effects are limited or uneven where governance is weak. Digital traceability systems and ICT-based services tend to improve data accuracy, reduce side-selling, and support better farm management, yet they require upfront investment, reliable connectivity, and sustained institutional support. Overall, multi-intervention projects that link certification with digital tools and farmer training demonstrate more consistent benefits for income stability, environmental compliance, and market access than isolated, single-tool approaches.

3-2 Discussion（考察）

These findings suggest that technology works best when embedded in accountable cooperative structures and supportive policy environments, rather than being introduced as a stand-alone solution. Insights from overseas reports and innovation studies underline the importance of stakeholder collaboration: effective projects connect global buyers, NGOs, governments, and farmer organizations around shared standards and transparent benefit-sharing mechanisms. From an innovation perspective, the key challenge is not only to design new tools, but to reconfigure relationships and incentives in the cocoa chain so that farmers capture a fairer share of value while meeting increasingly strict sustainability requirements.

4. Conclusion and Future Prospects

The study concludes that combining fairtrade certification with digital traceability, ICT services, and cooperative capacity building offers a promising route to improving the income and sustainability of cocoa farmers in West Africa. However, such approaches must be embedded in fair pricing policies, transparent premium distribution, and inclusive governance to avoid reproducing existing inequalities. Future work should explore concrete indicators of “fairness” and “living income,” experiment with consumer awareness strategies in developed countries, and investigate how emerging regulations can be leveraged to support, rather than burden, smallholder farmers.

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Toward eliminating the information gap between nations

～A society where anyone can easily access information～

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Abstract

This study addresses the digital divide between developed and developing countries by focusing on disparities in access to digital devices and IT education. Using literature-based research, it analyzes global data on digital device penetration, PC pricing, and existing platforms for IT learning. The results indicate that distributing low-cost used or imperfect PCs and providing beginner-friendly IT learning platforms can effectively mitigate both equipment shortages and skill gaps. This study concludes that integrating affordable device distribution with accessible education is a practical approach toward building a society where information is easily available to all.

1. Introduction

The rapid advancement of information and communication technology (ICT) has significantly transformed modern society. However, the benefits of digitalization are not equally shared across the world. While developed countries enjoy widespread access to the internet and personal computers, many developing countries continue to face serious barriers to digital access. This inequality, known as the digital divide, limits educational, economic, and social opportunities. The purpose of this research is to explore practical and sustainable ways to reduce the digital divide by improving access to digital devices and fostering IT human resources in developing countries.

1-1. Social Context

Globally, the number of IT engineers is heavily concentrated in developed countries, while regions such as Africa and parts of Asia account for only a small percentage despite their large populations. In addition, internet penetration rates in developing countries remain significantly lower than those in developed nations. Although smartphones are relatively widespread, personal computer ownership is still limited. As a result, many people lack opportunities to acquire advanced skills such as document creation, data analysis, and programming. This situation reinforces economic inequality and restricts participation in the global digital economy, making the digital divide a critical social issue.

1-2. Previous Research

Previous studies have examined the digital divide from various perspectives. Wamba and Carter (2019) analyzed the digital divide in the Global South and found that limited internet access, inadequate infrastructure, and insufficient education restrict the effective use of digital technologies. They emphasized the importance of infrastructure development and public digital education programs.

Van Dijk (2020) focused on the COVID-19 pandemic and demonstrated that the digital divide became more visible as education and work rapidly shifted online. The study

highlighted that people in developing countries and low-income communities were disproportionately disadvantaged. While these studies clarify the causes and impacts of the digital divide, they do not fully address concrete and low-cost solutions for device distribution and beginner-level IT education, which this research aims to explore.

1-3. Research Question

Based on these issues, this study sets the following research question:

“How can digital devices be distributed at low cost to developing countries in order to reduce the digital divide?”

This question is important because access to appropriate devices is a fundamental requirement for digital participation. Without affordable and usable hardware, efforts in digital education and skill development cannot be effective.

1-4. Hypothesis

This research hypothesizes that distributing low-cost used or imperfect PCs is a realistic and effective way to increase access to digital devices in developing countries. Since budget constraints make the distribution of new PCs impractical, refurbished and imperfect devices offer a feasible alternative. Furthermore, it is hypothesized that existing IT platforms are often too complex for beginners, and therefore a new, beginner-friendly learning platform is necessary. By combining affordable hardware distribution with accessible education, the digital divide can be reduced more effectively.

2. Research Method

This study adopts a literature-based research method. First, statistical data on internet, smartphone, and PC penetration rates in various countries were collected from online databases and reports. Second, price ranges of new, used, and imperfect PCs were compared to evaluate cost feasibility. Third, existing platforms for programmers, such as GitHub and Stack Overflow, were analyzed in terms of usability for beginners. Finally, prior academic studies on the digital divide were reviewed to identify common challenges and gaps. These data were systematically compared to evaluate the validity of the hypothesis.

3. Results and Discussion

3-1 Results

The findings show that while smartphone penetration in many developing countries exceeds 60%, PC penetration often remains below 40%. This indicates limited access to tools required for advanced digital tasks. In addition, price comparisons reveal that imperfect PCs are significantly cheaper than both new and standard used PCs, making them more accessible for low-income regions.

Regarding IT learning platforms, widely used services such as GitHub and Stack Overflow were found to be difficult for beginners due to complex interfaces, technical language, and strict usage norms. These factors create barriers for individuals with limited prior experience.

3-2 Discussion

The results support the hypothesis that low-cost device distribution is a key factor in reducing the digital divide. While smartphones enable basic communication, PCs are essential for acquiring professional digital skills. Therefore, distributing refurbished or imperfect PCs can expand learning opportunities.

Furthermore, the analysis of existing platforms suggests that technical communities are not sufficiently inclusive for beginners. Insights from overseas studies emphasize that education and infrastructure must develop together. From an innovation perspective, integrating user-friendly design and mentorship systems into a new platform could lower entry barriers and promote sustainable IT human resource development in developing countries.

4. Conclusion and Future Prospects

This study concludes that addressing the digital divide requires both affordable access to digital devices and effective IT education. Distributing low-cost used or imperfect PCs is a practical solution to equipment shortages, while developing a beginner-oriented IT learning platform can foster human capital. Together, these approaches can contribute to a more inclusive information society.

In the future, further research should involve field studies in developing countries and collaboration with NGOs and technology companies. Such efforts could refine distribution systems and educational platforms, ultimately supporting long-term digital empowerment.

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Improving Your Lifestyle Through Tea

～Relax with the Benefits of Green Tea～

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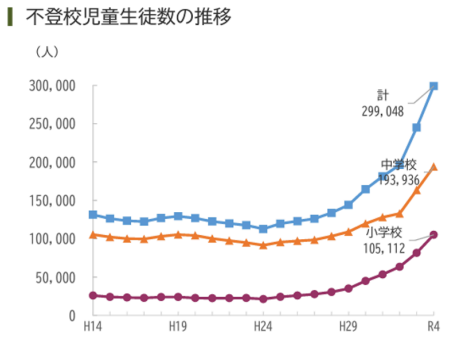
Abstract
In recent years, the number of people suffering from mental health problems has been increasing worldwide. This study aims to explore a practical and accessible method for reducing psychological stress in daily life, as a preventive approach to mental health problems.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)



In Japan, an increasing number of children and adolescents experience psychological stress caused by school life and surrounding environments. Mental health problems such as eating disorders, depression, and anxiety disorders related to stress have become serious social issues. Japan has the biggest number of patients that are taking hospital treatment to cure mental disorders. The potent and most harmful risk of having mental disorder is that a considerable proportion of people that suffered from mental disorder happened to be affected by dementia as well.

This is not only a problem in Japan or among young people. According to the World Health Organization (WHO), approximately one in eight people worldwide was affected by mental disorders in 2022. In addition, Reuters reported that if effective measures are not taken, mental health problems could cause economic losses of up to 16 trillion US dollars globally between 2010 and 2030.

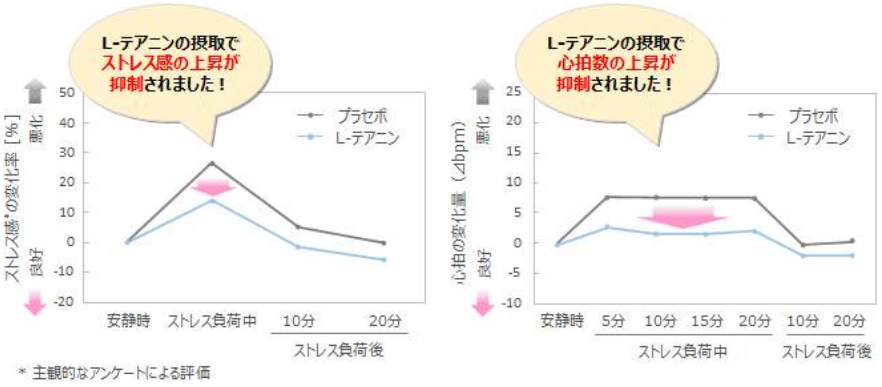
Mental disorders have significant social and economic impacts, and their symptoms and recovery processes vary greatly among individuals. Furthermore, about half of all mental health disorders begin during adolescence or early adulthood. Therefore, reducing stress before symptoms become severe is considered important.

This study does not aim to treat specific mental disorders. Instead, it focuses on individuals who experience accumulated daily stress, students showing tendencies toward school refusal, or those in the early stages of anxiety or emotional decline. The purpose of this study is to examine the potential of matcha-based foods as an easy and sustainable stress reduction method in daily life.

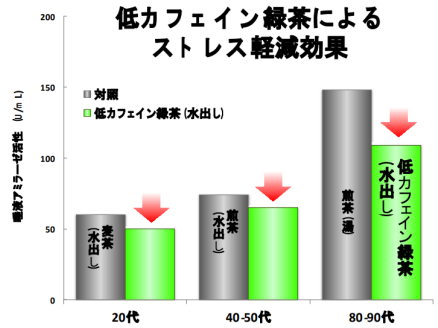
1-2. Previous Research

Mental disorders are influenced by psychological, physical, social, and genetic factors. Among these, psychological and physical factors such as excessive stress, lack of sleep, and irregular lifestyles are closely related to daily habits.

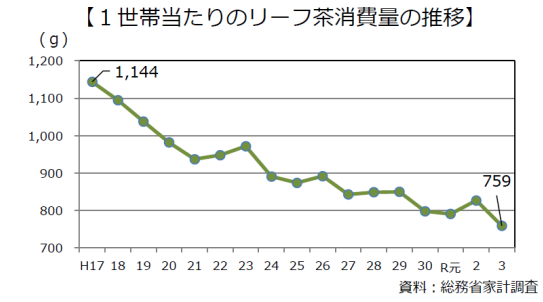
L-theanine, which is abundant in green tea, has been reported to reduce stress-related increases in heart rate and to promote relaxation. It is also known to improve sleep onset and reduce fatigue upon waking.

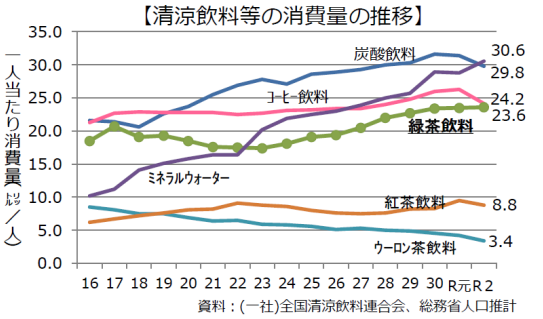


Some other research conducted by Kumamoto University shows that the components of matcha can ease one's temper or the amount of stress, and adrenaline.
Furthermore, a study by Shizuoka Prefectural University confirmed a significant decrease in salivary amylase activity in the group that ingested L-theanine, demonstrating an objective stress-reducing effect in humans. The same study also reported a similar trend with matcha-based foods (cookies), which is consistent with the results of this study. Considering these prior studies, it is highly likely that the stress reduction observed in this study was not coincidental but rather based on the physiological effects of matcha components.



1-3. Research Question (RQ)





Although various types of tea are known to have relaxing effects, tea consumption has been declining in recent years. Therefore, this study focuses on how green tea, particularly matcha, can be more easily incorporated into daily life. Based on this perspective, the research question is formulated as follows: “What alternative methods can enable efficient intake of theanine without relying on drinking green tea itself?”

Another research question is how much demand there is for matcha worldwide. Even if my experiment shows that theanine has the potential to reduce stress, this alone would not necessarily lead to widespread impact.

1-4. Hypothesis

From the research of Shizuoka University, I found out that the efficacy of theanine won’t change whether it is processed or not. Because my target of this research is adolescents, I wanted to find a way of consumption that is a daily thing for them. For this reason, I set my hypothesis as ‘Is matcha based sweets truly efficient to loosen our stress? ’. If normal sweets have enough effectiveness to loosen our stress, we won’t necessarily eat matcha sweets and eat normal sweets instead.

2. Research Method

Research Methodology First, investigate matcha consumption levels and its global market share. Next, determine the average quantity of powdered matcha contained in matcha-based confectionery and assess the anticipated effects of theanine based on this. It has been established that theanine retains its efficacy best when processed at low temperatures. Here, experiments will be conducted to measure the percentage reduction in stress levels achieved using either matcha powder or foods containing theanine. Experimental Overview This study aimed to clarify the effects of consuming commercially available sweets containing matcha on psychological stress states. Participants were students of the same age group, divided into two groups: a “Matcha Consumption Group” consuming matcha sweets and a “Control Group” consuming sweets without matcha components. Both groups consumed sweets once daily at a fixed time for a period of seven days. Stress levels were assessed using a simplified stress questionnaire (9 items, 5-point scale) developed for this study. The questionnaire was

administered twice: before the experiment began and after it concluded. The total scores from each administration were compared as stress indicators. Higher scores indicated a state of greater stress. The matcha sweets used in the experiment were commercially available products containing matcha powder as an ingredient. As matcha powder contains L-theanine, which has been reported to have relaxing effects, it was hypothesised that its consumption might reduce psychological stress. For the obtained data, the average stress scores before and after the experiment were calculated for each group, and the trends in change were compared and examined.

The questionnaire items were as follows:

1. I sometimes feel anxious for no reason

2. I feel restless and tense

3. I feel calm and at ease

4. I feel relaxed

5. I feel mentally tired

6. I find it hard to concentrate at

7. I find it hard to fall asleep

8. I feel tired when I wake up at 9 in the morning.

9.I feel strong stress in my daily life.

The response scale comprised five levels:

1: Not applicable at all

2: Not very applicable

3: Neither applicable nor inapplicable

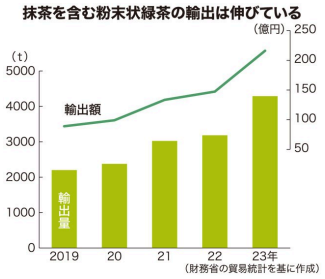
4: Somewhat applicable

5: Very applicable

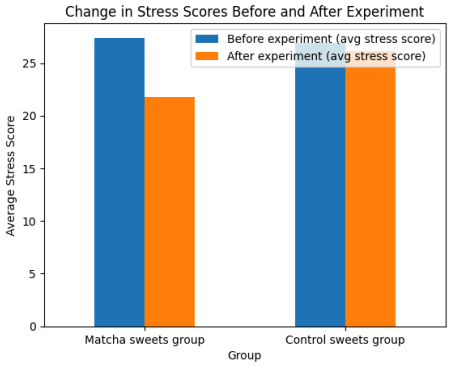
Research Findings and Analysis As evident from the two figures above, the rising demand for green tea suggests that more people are developing an interest in green tea itself. Furthermore, the research I conducted yielded the following graphs and tables.

3. Results and Discussion

3-1 Results（結果）



Research Findings and Analysis As evident from the two figures above, the rising demand for green tea suggests that more people are developing an interest in green tea itself. Furthermore, the research I conducted yielded the following graphs and tables.



グループ	実験前 平均ストレス得点	実験後 平均ストレス得点
抹茶スイーツ摂取群	27.4	21.8
対照群（抹茶なし）	26.9	26.1

In the matcha sweets intake group, the average stress score decreased by approximately 5.6 points after the experiment. In contrast, the change was minimal in the control group not containing matcha components, revealing a difference between the two groups.

3-2 Discussion（考察）

The results of this study indicate that the matcha sweets group showed a reduction in average stress scores of approximately 5.6 points between the pre- and post-experiment periods, confirming a tendency towards reduced psychological stress. Conversely, the control group, which did not consume matcha components, exhibited minimal change in stress scores, revealing a clear difference between the two groups. This suggests that components present in matcha may have exerted a certain influence on stress reduction.

The action of L-theanine, present in matcha, is cited as a factor contributing to this result. Previous research indicates that L-theanine regulates the balance of the autonomic nervous system and suppresses excessive sympathetic nervous system activity, thereby alleviating

increased heart rate and states of tension. Consequently, subjects who consumed matcha sweets showed improvements in items such as feelings of anxiety, mental fatigue, and difficulty falling asleep, which likely led to the reduction in stress scores.

Furthermore, the fact that matcha was consumed in the form of “sweets” in this study is also significant. Compared to the conventional act of “drinking green tea”, sweets present a lower psychological barrier and can be consumed enjoyably. Therefore, alongside the effects of the matcha components themselves, psychological factors such as “a sense of reassurance from consuming sweetness” and “mood elevation from eating something enjoyable” may also have contributed to stress reduction. Consequently, the effects of matcha sweets are thought to result from a combination of both compositional and psychological factors.

However, this study also presents several limitations. Firstly, the sample size was limited, and the experimental period was short at seven days, potentially making it insufficient for generalising the results. Furthermore, relying solely on questionnaires for stress assessment is a limitation, as it may be influenced by the subjects' subjective judgements. Additionally, the precise amount of theanine contained in the matcha sweets was not measured, preventing a quantitative demonstration of the relationship between intake and effect.

Nevertheless, this study holds significance in focusing on stress reduction at the pre-symptomatic stage, rather than aiming for the “treatment of mental disorders”. Particularly for students showing tendencies towards school refusal or young people experiencing accumulated daily stress, alleviating stress through sustainable, manageable methods is crucial. In this regard, matcha sweets suggest potential efficacy as a readily integrated means within daily life.

4. Conclusion and Future Prospects

This study investigated the effects of consuming commercially available sweets containing matcha on psychological stress levels. Results showed a reduction in stress indicators before and after the experiment in the group consuming matcha sweets, suggesting that matcha components may contribute to inducing a relaxed state. Conversely, no significant changes were observed in the control group consuming sweets without matcha components. These findings suggest that components in matcha, such as L-theanine, may exert a certain influence in reducing feelings of anxiety and tension in daily life. However, this study does not demonstrate therapeutic effects for specific mental disorders and is not a substitute for medical diagnosis or treatment. Consequently, it can be concluded that methods utilising matcha hold potential as a stress-reduction measure that can be readily incorporated into daily life for individuals exhibiting school refusal tendencies or accumulating stress.

Future research challenges include increasing the number of subjects and extending the experimental period. The small sample size and short duration of this study limit the generalisability of its findings, necessitating the collection of more extensive data in subsequent research. Furthermore, while psychological stress was assessed via questionnaires in this study, incorporating objective indicators such as heart rate and sleep duration in future research could enhance the reliability of the findings. Furthermore, comparing the effects of different consumption forms—such as matcha beverages or homemade sweets—beyond matcha sweets alone is another future research topic. Moreover, exploring practical methods for incorporating matcha into daily life, particularly in settings like schools and homes, could potentially contribute to stress prevention and lifestyle improvements among young people.

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The Relaxing Effects of Tea (Green Tea)

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https://jp.reuters.com › article › world

Current Situation of People with Mental Illness

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Nikkei Gooday: The Relaxing Effects of Tea (Green Tea)

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https://www.jstage.jst.go.jp/article/jsptsuppl/42/0/42_3-P-U-3/_pdf/-char/ja

Research Conducted by Kumamoto University

https://www.srut.org/wp/wp-content/uploads/20cf69d79612c7d3298012227cbd2060.pdf

To Reduce Food Waste in the developed countries

～Install compost systems in urban areas to reduce the amount of food waste.

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ID 5426 氏名Daisuke Makioka

【To reduce food wate in developped countries】 5426-makioka

Abstract （研究の概要）
Many developed countries burn food waste, which causes pollution and uses a lot of energy. This study examines whether composting can help increase food-waste recycling rates. South Korea is a successful example, as it raised its recycling rate by using strict waste separation and composting systems. The study looks at problems such as bad smells, pests, and limits on installation, and suggests solutions like using deodorants, teaching proper waste separation, and using electric food-waste processors. Although composting cannot reduce all food waste at once, sharing information through the Internet and social media may help more people understand its importance and increase recycling in the future.

1. Introduction (Background, Significance, and Purpose)

Today, a large amount of food waste is produced around the world. In many developed countries, people burn a high percentage of this waste. However, burning food waste uses a lot of energy because it contains a lot of water, and it also creates air pollution. These problems are becoming more serious, and they have a negative effect on the environment. For this reason, it is important to think about better ways to deal with food waste.

1-1. Social Context (Current Situation and Problems)

Today, the amount of waste produced around the world has become a serious problem. Countries such as the United States, China, and Japan are known for producing especially large amounts of waste. In addition, countries like Denmark and Norway have very high rates of waste incineration.

Among these countries, South Korea has succeeded in greatly reducing its food-waste production and increasing its recycling rate. In the late 1990s, Korea started several measures to solve its waste problems, including a system that required people to pay for the amount of household waste they produced. However, people living near landfill sites began to protest because of bad smells and concerns about environmental pollution. As a result, in 2005 the government passed a law that banned the direct landfilling of food waste and required citizens to separate food waste from other trash.

Later, in 2013, composting of food waste became mandatory. People were required to buy special biodegradable bags and put their food waste in them. Throwing food waste into the ocean was also banned. The same rules applied to businesses, which were asked to reduce food loss as well.

Thanks to these efforts, Korea achieved remarkable results. The food-waste recycling rate increased from less than 2% in 1995 to about 95% today, turning the country from one of the biggest food-loss producers into one of the world’s leading food-recycling nations. In Seoul, the recycling rate even reached 100% for three years in a row starting in 2006.

This example shows that if Korea was able to transform itself from a major food-loss nation into a recycling leader, other developed countries around the world also have the possibility to raise their currently low recycling rates.

1-2. Previous Research

The Igarashi Shokai Resource Recycling Center is working on a food-recycling project. In this project, food waste from places such as schools is collected and turned into compost at the center. This compost is then provided to local farmers, who use it to grow vegetables and other products. The food produced on these farms is later supplied back to the schools. The food waste created at the schools again is collected and recycled at the center, completing the cycle.Through this system, the Igarashi Shokai Resource Recycling Center aims to create a recycling-based society where resources are used effectively and waste is reduced.

1-3. Research Question (RQ)

The research question of this study is:

“Can developed countries increase their food-waste recycling rates by using composting?”

1-4. Hypothesis

The hypothesis of this study is that it may be possible to install compost systems in city areas and spread their use. First, we need to consider whether placing compost bins in urban spaces is actually realistic and possible.

2. Research Method

To examine this hypothesis, the study will first look at the advantages and disadvantages of composting. After identifying the disadvantages, we will think of possible ways to solve these problems. In addition, we will refer to the methods used in South Korea, which has successfully increased its food-waste recycling rate through composting.

By studying the actions taken in Korea and selecting the ones that could also be used in other developed countries, we will consider how these methods might work if they were introduced in such countries.

3. Results and Discussion

When we looked into why composting is not common

in Japan, three main reasons were found:

1. **There is a risk of bad smells and pests.**
2. **Food waste that cannot be broken down by microorganisms cannot be put into the compost.**
3. **Depending on the type of compost, the place where it can be installed is limited (noukinavi.com).**

To solve the first problem, fermentation promoters can be used to raise the temperature inside the compost to around 60°C, which kills pests. However, this effect is temporary, so the promoter must be added regularly. Using organic deodorants can also remove bad smells, such as ammonia, and help prevent odors inside the compost.

For the second problem, proper separation of waste is important. Items that are difficult to decompose should not be put in the compost. To help people know what can and cannot be put into compost, information should be shared widely through the Internet and social media.

For the third problem, electric food-waste processors can be installed near waste incineration facilities, allowing people to add food waste to compost at any time. These machines mix soil and waste with rods inside the processor, supply air to microorganisms, and use the microorganisms' power to turn food waste into compost.

With these solutions, it may be possible to install compost systems in city areas in Japan, similar to what has been done in South Korea.

4. Conclusion and Future Prospects

It is not possible to immediately reduce all food waste in developed countries by composting. However, it is important to make this method more widely known around the world. To do this, we need the help of the Internet and influential people, such as social media influencers.

People around the world also need to understand the current situation of food waste and take action to solve this problem. By raising awareness and sharing information, it may become possible to increase food-waste recycling and reduce environmental damage globally.

5. References

South Korea once recycled 2% of its food waste. Now it …

World squanders over 1 billion meals a day - UN report - UNEP

How South **Korea** recycles 98% of its **food waste**

Vector-borne disease by Global warming

～How can we prevent spreading vector-borne disease?~

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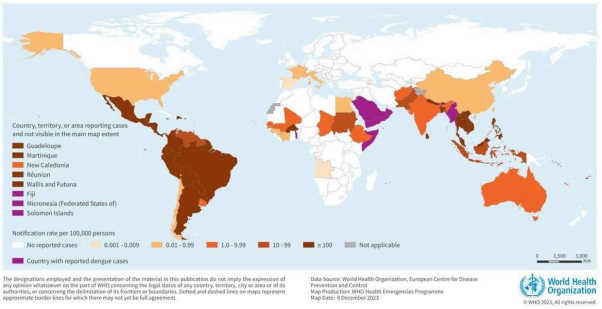
ID 5427 氏名 間庭 廉

【Vector-borne disease by Global warming】 5427 Maniwa Ren

This research investigates preventing vector-borne diseases worsened by global warming. It compares developed and developing countries, highlighting the UAE's effective insect control measures. The study proposes establishing low-cost strategies in developed countries and introducing them to developing countries to reduce disease spread and promote healthier, sustainable development.

1.Introduction

Today, Global warming affects our lives in many ways such as lack of food or sea level rising. These instances I introduced are classified into big problems. I think it is important to think about small problems that arise from big problems. In developing countries, vector-borne disease has bad effects for people. This picture represents the habitat of bugs which have that disease. We can find the habitat tends to be religions of tropics. The purpose of this research is to prevent spreading these diseases.



1-1. Social Context

If we could prevent vector-borne disease, many people will live healthy. It helps develop the country. And it will stop social confusion caused by these diseases.

1-2. Previous Research

Vector-borne diseases are caused by bugs which have that. Transmitted to humans and animals through the bites of infected mosquitoes, fleas, or ticks. Not to get these diseases, avoiding getting bites such as covering our skins is important. This previous research contributes to my research in ways to find solutions to this problem , but I couldn't understand the relationships between global warming and spreading vector-borne disease.

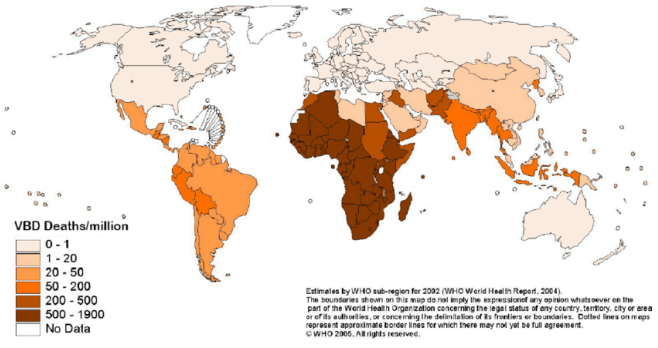
1-3. Research Question (RQ)

How can we prevent spreading vector-borne disease without using vaccines?

Using vaccines has many costs. This solution is not appropriate for developing countries because of poverty. Therefore, I think I should think of ways not to use vaccines.

1-4. Hypothesis

Cooperating with countries and establishing counterplan for vector-borne diseases. This map represents the number of deaths caused by vector borne diseases. I focused on the UAE. The country includes the trending of these diseases but the number of people is lower than other regions. I thought that's because the country isn't a developing country and it has a counterplan for that disease. Sharing



counterplan for many countries becomes the best solution for these diseases.

2. Research Method

First, I will look through data on major vector-borne infectious diseases around the world and examine countries that show distinctive patterns. Then I will compare them with developing countries to find the differences. Finally, I will check whether these findings match my hypothesis.

3. Results and Discussion

3-1 Results

1.From the map above, we can see that the United Arab Emirates has a desert climate, and desert-climate countries in Africa also have outbreaks.

2.UAE removes standing water and has cleared over 400 mosquito breeding sites.
・Special teams check cities for mosquitoes using tools like GPS.

・Experts study mosquito species to understand how they spread disease.

・Fogging and spraying are used in areas with many mosquitoes.

・Hospitals quickly report dengue so health workers can respond fast.

3-2 Discussion

It shows that climate alone does not strongly control vector-borne disease spread. Even though the UAE has a desert climate that seems unsuitable for these diseases, cases still occur. Also, many desert regions in Africa have large outbreaks, proving that vector-borne diseases can spread even in hot, dry climates.

In developed countries, measures against insects, such as using mosquito nets and removing standing water, are well established. We can adapt these measures for developing countries. Since the research is done in developed countries, the cost can be reduced, making it possible to introduce these measures in developing countries as well.

In my previous research, using vaccines was the solution I focused on, but after reviewing the literature, I shifted to research aimed at preventing further spread.

4. Conclusion and Future Prospects

The final proposal follows the hypothesis: we establish low-cost measures in developed countries and introduce them to developing countries. This will reduce infectious diseases in developing countries and lead to better development.

In considering measures against infectious diseases, we almost deviated from the original research.

The element of global warming was lost.

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Development of African Agriculture

～mechanization of primitive system～

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Abstract

The aim of this study is to examine the relationship between agriculture and poverty, and to address poverty in Africa by introducing modernized agricultural practices.

1. Introduction (Background, Significance, and Purpose)

In Africa, development remains stagnant in several regions, and many areas are still unable to escape poverty. People continue to suffer from hunger and forced migration on a daily basis. In particular, in regions with harsh climates and environments such as desert areas, some residents live constantly on the brink of death. Currently, nearly 250 million people in Africa suffer from hunger, and there are no clear signs of improvement. In addition, the continent faces economic challenges, political instability, and ongoing internal conflicts.

1-1. Social Context (Current Situation and Problems)

Most African countries, classified as low-income nations, rely heavily on agriculture as their primary industry. Their main means of earning foreign currency is through the export of mineral resources. However, domestic production capacity remains insufficient to meet Africa's growing demand for consumption.

1-2. Previous Research

In the past, support from developed countries—including Japan—toward developing nations included financial assistance, infrastructure development, transportation technologies, technical cooperation that leveraged each country's strengths, and the dispatch of skilled personnel. Recently, international attention has increasingly shifted toward difficult issues such as education and energy, which are closely tied to various global challenges.

1-3. Research Question (RQ)

As African agriculture develops, it is expected to contribute to global food security at a time when agricultural populations and rural communities in developed countries continue to decline. Therefore, could Africa import used agricultural machinery from other countries as a means of improving efficiency in its agricultural sector?

1-4. Hypothesis

In the past, developed countries actively provided human resource development for people in Africa and other regions. Because of this history, the challenges related to technical skills needed to operate agricultural machinery and to basic agricultural knowledge may be less significant than expected. Furthermore, many countries today continue to dispatch personnel or invite trainees across various

2. Research Method

Investigate past successful cases, the purchasing trends of not only Japanese but also foreign-made products, and the accompanying challenges through existing literature. In addition, examine whether there are agricultural tools suitable for agriculture in Africa.

3. Results and Discussion

3-1 Results（結果）

The major crops cultivated and shipped in countries where agriculture is highly developed include coffee, tea, maize, and various beans, all of which are greatly affected by natural environmental conditions. These crops are also considered well-suited to land use in Africa. After examining what types of agricultural machinery would be appropriate for cultivating such crops, I concluded that tractors, which are already widely available, are the most suitable

option.This is because tractors possess a wide range of functions: they can plow soil, perform puddling, spread fertilizers, shape paddy-field ridges, cut grass, and form bales, among many other tasks. Owing to this versatility, tractors can be effectively used in agricultural practices adapted to Africa's natural environment. Moreover, while different attachments must be prepared depending on the specific purpose, tractors can handle an entire series of farming operations, making them far more economical than owning multiple expensive machines.

3-2 Discussion（考察）

The answer to this research question is that, although it is not possible at this stage to design detailed plans for transportation or training on how to use the machinery, I was able to identify a potential starting point for introducing agricultural machines. If successful, this initiative could make a significant contribution to the development of agriculture. Moreover, securing food supplies is an important global challenge, and considering the potential emergence of other social and environmental issues, I hope to continue working toward solving the remaining unresolved problems.

4. Conclusion and Future Prospects

Remaining issues include whether companies will be willing to engage in low-cost transactions for used agricultural machinery and the uncertainty surrounding the demand for agricultural equipment in Africa. I intend to gradually address and clarify these challenges moving forward.

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Let’s Take the Train!

～ Promoting Effective Use of Global Railways through Japanese Railway Technology ～

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Abstract

This research explores how Japanese railway technology can improve transportation in developing countries. Railways are vital for society, but many countries suffer from delays and accidents. Through a literature review and analysis of JICA projects, I investigated Japan’s support in countries like India. The results show that exporting "hardware" (trains and signals) is not enough. I conclude that transferring "software"—specifically a safety culture and training systems—is essential for sustainable and safe railway operation.

1. Introduction

1-1. Social Context

Railways are an environmentally friendly and efficient way to move many people. In Japan, trains are famous for being safe and punctual. However, in many developing countries, railway infrastructure is old or underdeveloped. This causes frequent delays, overcrowding, and serious accidents. Improving these systems is necessary for the economic growth and safety of those regions.

1-2. Previous Research

Many previous studies have focused on the export of physical technology, such as building new tracks or selling high-speed trains. However, simply introducing high-performance machines does not always work well if the local staff cannot use them properly. Recent reports from JICA suggest that support for "operation and maintenance" is becoming more important than just building infrastructure.

1-3. Research Question (RQ)

How can Japan’s advanced railway technologies, such as signal systems, timetables, and vehicle design, be applied to improve and expand railway use in different countries

1-4. Hypothesis

I hypothesize that introducing Japan’s signal systems and timetable design will improve safety and efficiency. However, technology alone is not enough. I believe that combining technology transfer with the establishment of a "safety culture" and local training systems is the key to long-term sustainable railway operation.

2. Research Method

To verify my hypothesis, I conducted a literature review and a case study analysis.

First, I researched the characteristics of Japanese railway technology (signals, timetables, maintenance).

Second, I analyzed international cooperation projects by JICA (Japan International Cooperation Agency), focusing on cases in India and Bangladesh. I looked for information on how they handle safety and training.

Finally, based on theories from Innovation Studies, I designed a model for applying these findings to local communities.

3. Results and Discussion

3-1 Results

Through my research, I found two main facts.

1. Technological Strength: Japan’s strength lies in its "signal systems" that prevent collisions and "timetable design" that allows high-frequency operation.

2. JICA’s Approach: In projects like the Delhi Metro in India, JICA did not just build the railway. They also implemented strict safety education and "files of rules" similar to those in Japan. They emphasized human resource development, teaching local drivers and engineers how to maintain the trains themselves.

3-2 Discussion

Based on the results, I considered the meaning of "technology transfer."

The fact that JICA focuses on training shows that machines need human skills to work safely. If we only give a country a fast train but do not teach them how to fix it, it will eventually break and become unsafe. From the perspective of Innovation Studies, I learned that innovation is the combination of technology and social systems. A system that works in Tokyo might not work in another country if the culture is different. Therefore, simply copying the Japanese manual is not the right answer.

My proposed approach is "Co-creation of Safety Culture." Japanese engineers and local operators must work together to adapt the rules to the local culture. For example, instead of just imposing strict rules, we should foster a mindset where every worker feels proud and responsible for safety. This "soft" aspect is the true driver of innovation in global railways.

4. Conclusion and Future Prospects

In conclusion, to answer my Research Question: Japan’s railway technology can be applied effectively only when it is combined with education.

The key is to export "Hardware" (trains/signals) + "Humanware" (safety culture/maintenance skills).

By doing this, developing countries can operate railways safely by themselves long after the Japanese project ends.

For future prospects, I suggest creating a standard "training curriculum" that can be adapted to different countries. This will help more nations enjoy the benefits of safe and efficient railways, leading to a better global society.

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Bridging Healthcare Inequality in Rural Kenya

～The Potential of AI-Driven Telemedicine Robots～

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Abstract

This research examines how AI-driven telemedicine robots can reduce healthcare inequality in rural Kenya, where there is a severe shortage of medical professionals. The study begins by analyzing the social context and previous research on Kenya's healthcare challenges. A literature-based research method was used to review data, official reports, and case studies of telemedicine technologies. The results show that AI diagnostic tools and remote consultation systems have strong potential to expand access to basic medical services in underserved areas. Based on these findings, this paper proposes a model for an affordable and feasible telemedicine robot system designed for rural Kenyan communities.

1. Introduction (Background, Significance, and Purpose)

Global health inequality remains one of the most urgent challenges in the 21st century, and Kenya is one of the countries where this gap is especially visible. While urban areas such as Nairobi have relatively good access to medical facilities, many rural regions still suffer from severe shortages of doctors, limited medical equipment, and long travel distances to hospitals. According to the World Health Organization, Kenya has only about 2 doctors per 10,000 people, which is far below the global average. This shortage results in delayed diagnoses, preventable deaths, and unequal access to essential treatment.The significance of this study lies in exploring how emerging technologies, especially medical robots used for telemedicine, can reduce these inequalities. As robotic-assisted care and remote medical systems rapidly develop worldwide, they offer a new opportunity for countries like Kenya, where the distribution of healthcare workers is uneven. By focusing on Kenya's healthcare system, this research aims to clarify the challenges that widen medical inequality and examine whether medical robots could serve as a realistic solution.The purpose of this research is to investigate the current situation of Kenya's healthcare disparities and evaluate the potential of medical robotics as a tool to improve access to quality medical services. Through analyzing existing data, international case studies, and previous research, this study seeks to provide a proposal for a sustainable telemedicine model that could reduce the urban–rural healthcare gap in Kenya.

1-1. Social Context (Current Situation and Problems)

In rural Kenya, healthcare inequality remains a critical issue. The doctor-to-population ratio is approximately 1 doctor for every 5,725 people, far below the WHO recommendation of 1 doctor per 1,000 people. Although 72% of Kenya's population lives in rural areas, most medical professionals are concentrated in urban centers, creating a severe imbalance in healthcare access. Furthermore, 93% of rural health facilities cannot provide basic outpatient services, and 84% are unable to offer essential maternity care. These conditions make it extremely difficult for rural residents to receive timely and reliable medical attention.

1-2. Previous Research

Previous research highlights the persistent shortage of healthcare workers in Kenya and the growing interest in telemedicine as a complementary solution. Studies by WHO and the Kenyan Ministry of Health emphasize that digital health technologies can support early diagnosis and reduce the burden on limited medical staff. However, few studies focus specifically on AI-driven telemedicine robots, and their applicability to low-resource rural settings remains underexplored.

1-3. Research Question (RQ)

The central research question of this study is:
"How can medical robots used for telemedicine reduce healthcare inequality in rural Kenya?"
This question emerges from Kenya's severe mismatch between healthcare needs and available resources. In many rural areas, the doctor-to-population ratio is extremely low—often around 1 doctor for more than 5,000 people, far below the WHO recommendation of 1 doctor per 1,000 people. Although over 70% of the population lives in rural regions, most doctors and nurses are concentrated in cities. As a result, many rural residents must travel long distances for medical care and often cannot receive timely diagnosis or treatment. Telemedicine has been introduced in several countries to address similar problems, but Kenya still faces challenges such as limited medical infrastructure, unstable internet connectivity, and a lack of technology designed for rural clinics. By focusing on medical robots—machines that can support remote diagnosis, monitoring, and communication with specialists—this research aims to examine whether such technologies could realistically improve healthcare access in underserved communities. This research question is significant because it connects two important global issues: the rapid growth of medical technology and persistent healthcare inequality in developing countries. Understanding this connection could provide a pathway toward building a more sustainable and equitable healthcare system for rural Kenya.

1-4. Hypothesis

I hypothesize that an affordable AI telemedicine robot capable of performing basic health assessments and connecting patients with remote doctors can significantly reduce healthcare inequality in rural Kenya. This is based on previous studies showing that digital diagnostic tools improve patient triage and access to care in underserved areas.

2. Research Method

This research uses a literature study method. I reviewed academic papers, WHO reports, Kenyan government statistics, and case studies of telemedicine technologies. I compared different AI diagnostic systems and analyzed their feasibility in low-resource rural settings. The hypothesis was examined by evaluating whether existing technologies could realistically be implemented in Kenyan rural communities.

3. Results and Discussion

3-1 Results

The results of this research showed several clear patterns regarding healthcare inequality in rural Kenya and the potential role of medical robots. First, the collected data confirmed that the doctor-to-population ratio in rural areas remains extremely low, often around one doctor for more than 5,000 people, while most professional healthcare workers are concentrated in urban regions. Additionally, more than 70% of Kenya's population lives in rural areas, yet many rural clinics lack basic services. Reports showed that a large percentage of rural health facilities cannot provide essential outpatient care or maternity services, making it difficult for residents to receive timely medical attention. Second, the literature review revealed that telemedicine has been introduced in several African countries, and in some cases, remote consultations helped reduce travel time and improved diagnosis rates. However, Kenya faces challenges such as limited internet connectivity, insufficient equipment, and a lack of trained staff to operate advanced technologies. Finally, the analysis of international examples demonstrated that medical robots—especially those designed for remote communication, diagnosis, and monitoring—have been successfully used in countries with similar shortages of medical personnel. These examples suggest that medical robots could potentially support rural clinics in Kenya by enabling real-time connections with specialists in urban hospitals.

3-2 Discussion

These results suggest that an AI-driven telemedicine robot could support basic healthcare in rural Kenya. The evidence from other countries indicates that such systems can be successfully adapted to low-resource environments. Therefore, my hypothesis is supported: a simple, cost-effective robot focusing on basic diagnostics and remote connectivity could help reduce healthcare inequality.

4. Conclusion and Future Prospects

This study concludes that AI-driven telemedicine robots have strong potential to improve healthcare access in rural Kenya. By providing basic diagnostics and remote doctor consultations, such systems could reduce the burden on urban medical facilities and support underserved communities. In the future, developing a prototype and conducting field tests will be essential to evaluate the system's practical effectiveness.

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Producing environmentally friendly fuel

~ To popularize biofuels ~

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Abstract

Bioethanol fuel is expected to be an environmentally friendly fuel due to its characteristics, but it faces many problems, such as limited production areas and competition with food sources. Therefore, I propose reconsidering the crops used as raw materials. Bioethanol fuel is usually made from sugarcane and corn, but I hypothesize that more bioethanol fuel could be produced by adding rice and wheat, which are grown in more areas. This requires crop breeding, but this is easily possible with modern technology.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

In recent years, the effects of global warming have become more severe around the world, with decades-long disasters occurring almost every year. One of the causes of these frequent disasters is energy issues. Greenhouse gases, particularly carbon dioxide, which are considered the primary cause of global warming, are emitted in large quantities by power plants and transportation, and despite efforts by various countries to address these issues, their emissions continue to increase. Therefore, reducing greenhouse gas emissions is a major global goal to prevent further increases in the impacts of global warming. So, what is the best way to reduce greenhouse gases? Greenhouse gas emissions increase with each country's industrial development. Therefore, reducing the operation of facilities that emit particularly large amounts of greenhouse gases, such as thermal power plants, could hinder a country's economic development. For this reason, I focused on transportation fuels as a way to prevent global warming. Currently, many of our transportation methods, such as cars and trains, use fossil fuels. Because fossil fuels emit large amounts of carbon dioxide when burned, various non-fossil fuels are being used today to help curb emissions. Among these, I became interested in bioethanol fuel. Bioethanol fuel is ethanol produced by fermenting biomass, such as sugarcane, corn, and wood. Like fossil fuels, it produces carbon dioxide when burned. However, because the carbon dioxide emitted during combustion is absorbed by the plants that produce biofuels, the net carbon dioxide emissions are close to zero. Bioethanol has attracted global attention as a renewable energy source. Furthermore, many other renewable energy sources, such as wind and solar power, have unstable energy production because their energy supply depends on several factors, including weather. From this perspective, I focused on biofuels, which can provide energy at any time as long as the raw materials are available, and investigated their drawbacks and how they can be resolved. Biofuels have two uses: power generation and transportation fuels, such as automobiles. For the purposes of this definition, we will focus on increasing the adoption of biofuels for the latter purpose.

First, biofuel raw materials have the problem of very limited production areas. While the main sources of biofuels are corn and sugarcane, most of these crops are grown in tropical regions. Therefore, regions that do not produce the raw materials must import them from these

producing areas. This incurs costs for transporting raw materials. Not only that, the production process for biofuels is more complex than for fossil fuels, resulting in higher production costs. Another issue arises in terms of competition for food. If fuel production centered on corn and sugarcane were to be further promoted, problems such as rising grain prices and food shortages could arise. For this reason, we decided to investigate how biofuels could be popularized around the world while overcoming these challenges.

1-2. Previous Research

This study investigated the amount and usability of non-standard agricultural products as raw materials for bioethanol in the Tokachi region of Hokkaido from four perspectives: collection, transportability, storability, and price. As a result, wheat was found to be the most suitable

form of biofuel raw material among the surveyed crops.
As mentioned above, wheat has the potential to become a major raw material for biofuels. Using wheat could increase the amount of biofuel available and make it easier to use biofuels in our daily lives. However, there are various barriers to using wheat. The most important of these is the amount of wheat produced in each country.

1-3. Research Question (RQ)

Wheat production varies from country to country, and regions with low wheat production have less wheat to use for biofuel. Therefore, these regions must rely on imports from other countries, which incurs high transportation costs and emits a lot of carbon dioxide. Furthermore, wheat is used as a staple food in many countries and regions around the world, and some areas suffer from food shortages. Therefore, these countries may not be able to produce biofuel due to food competition issues. Therefore, we determined that it would be extremely difficult to popularize biofuel if wheat was used primarily as a raw material for biofuel.

2. Research Method

Research methods will mainly focus on English-language papers, and students will consider what methods are most effective after comparing and referencing papers on overseas experiments, etc.

3. Results and Discussion

3-1 Results

Currently, the mainstream approach is the "large-scale centralized" model. This involves

farmers transporting straw directly by truck from farmland spread across hundreds of kilometers to a single, massive factory. However, this approach has a fatal drawback: the factory is too far away, resulting in enormous gasoline and labor costs (transportation costs) and making it unprofitable. Therefore, this research proposes a system that establishes a straw collection hub near the farmland, rather than directly to the factory. Here, we define this as a "regional collection center" that collects straw from farmers within a radius of several kilometers. By first collecting straw at a nearby hub rather than immediately transporting it to a distant factory, the system reduces the burden on farmers and lays the foundation for efficient logistics. This method is already being considered in agricultural regions such as the Punjab region of India, where the development of such collection hubs is expected to facilitate the collection of straw scattered across vast farmland. This decentralized system is considered highly effective in areas where road conditions are poor and individual farmers cannot travel long distances. Rather than simply using the model already in use in India and elsewhere, this

research focuses on the "compression" function. While complex chemical processing is typically performed at these facilities, this approach makes the equipment too expensive and prevents widespread adoption. Therefore, this proposal focuses on the simple task of "physically crushing and compacting the straw." This approach allows for cost-effective implementation and operation, even in areas lacking advanced technology. So, how can "compacting locally" address the cost drawback of second-generation bioethanol? The first reason is that it eliminates the waste of transporting air. Freshly harvested wheat straw is fluffy and very light. Even when loaded to the fullest in a truck, most of the contents are air gaps, with only a small amount of actual straw. In other words, conventional transportation involves burning fuel to transport air, not straw. However, in the system proposed here, straw is powerfully pressed into pellets within the hub. This reduces the straw's volume to about one-tenth of its original size, dramatically increasing the amount of straw that can fit on a single truck and enabling the transport of "highly packed energy." The second advantage is the expansion of the transportable area. Increasing the amount that can be transported at one time significantly reduces transportation costs. Until now, the area where transportation costs exceeded the break-even point was limited. However, pelletization significantly reduces fuel consumption by transport trucks, enabling transportation from longer distances. This makes it possible to collect large amounts of raw material from a wide area at a single chemical plant, allowing for larger plants and more efficient ethanol production.

3-2 Discussion, Conclusions, and Future Prospects

In this way, we can convert biofuel feedstock to wheat straw, which does not compete with food, and further increase its density through decentralized hubs, enabling more effective dissemination. Increasing the energy density locally before transporting is extremely useful for both solving environmental issues and increasing the use of biofuels. In the future, I would like to think about how much carbon dioxide emissions can be reduced using this method, and in what areas it would be appropriate to introduce this method.

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The Global Plastic Plobrem

～How can we reduce plastic waste in our daily lives(12pt)

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Abstract

The problem of plastic waste has become more serious, and today microplastics are found not only in marine animals but also in human blood. Therefore, I have been studying how we can reduce plastic waste from daily life, especially plastic packages, which make up the largest part of plastic waste.As a result of my research, I first thought that increasing the use of eco-friendly products might help reduce plastic waste, so I investigated the usage and effects of eco-products. However, the results showed that eco-products alone are not enough to reduce plastic waste.Therefore, I propose expanding the use of biomass plastics, which are plastics made from natural materials.

1. Introduction (Background, Significance, and Purpose)

The problem of plastic waste has become very serious, and it affects not only marine life but also the human body. For example, a study in the Netherlands in 2022 found microplastics in the blood of 17 out of 22 healthy adults. This shows that plastic pollution is caused by human activities and is now a threat to our health.Because of this situation, it is important to think about how we can reduce plastic waste, especially plastic packages that come from daily life. My study focuses on finding ways to decrease plastic waste and protect both the environment and human health.

1-1. Social Context (Current Situation and Problems)

Plastic pollution is becoming a global crisis. Every year, about 30 million tons of plastic waste are illegally dumped, and 8 million tons of it enter the ocean. The recycling rate is only 9%.Plastic waste causes many problems. In fisheries and aquaculture, it costs money to check and remove plastic from seafood, fishing nets can be damaged, and fish catches may decrease. In tourism, plastic waste can damage boats and ruin the appearance of beaches, which reduces the number of visitors and hotel users. According to the OECD, these problems cause an economic loss of 13 billion dollars every year.Plastic also releases a large amount of carbon dioxide when it is produced and burned. Since plastics are made from fossil fuels, increasing plastic production leads to faster depletion of these resources. Today, global plastic production has reached more than 450 million tons since 1950.

1-2. Previous Research

In fish species such as the chub mackerel, 63.5% of individuals were found to have mistakenly ingested microplastics. It was also discovered that the largest category of plastic waste is “packaging,” which includes items such as plastic bottles, plastic bags, and food containers.Regarding efforts to reduce plastic waste, the United States has established laws that ban the sale of products containing microbeads (which are similar to microplastics), and some regions have prohibited the distribution of plastic bags. In the EU, guidelines and standards have been created to promote the rapid recycling of plastic waste, and some countries have banned the distribution of single-use plastics. In China, the import of waste plastics (containers and packaging made of plastic with recycling marks) has been banned, and the distribution of certain plastic products is regulated. Regulations on plastic bags are being implemented in many countries, regardless of whether they are developed or developing nations.However, as the global demand for plastics continues to rise, these efforts alone are becoming insufficient to control the plastic waste problem.

1-3. Research Question (RQ)

I decided to conduct my research with the following research question: “How can we reduce plastic waste generated from daily life?” I focused on daily life because previous studies showed that plastic packages are the largest source of plastic waste. I also considered that these types of plastic waste are mostly produced in everyday activities.Based on this result, I thought that replacing plastic packaging with alternative materials might be the most effective way to reduce the amount of plastic waste. In addition, by doing so, people’s awareness of plastic waste could improve, which may also help increase the recycling rate. For these reasons, I chose to focus on daily life, which is closely connected to people’s everyday behaviors.

1-4. Hypothesis

I thought that using eco-friendly products might be an effective way to answer this research question. Specifically, I focused on items such as reusable bottles and eco-bags. These products are often used in daily life, and if people do not have them, they tend to use single-use plastic items instead. Therefore, I believed that increasing the frequency of using such eco-friendly products could help reduce some of the single-use plastics.――――

2. Research Method

I also examined the usage rates of each eco-friendly product, such as eco-bags and reusable bottles, as well as the effects of using them.

3. Results and Discussion

3-1 Results（結果）

The results showed that the usage rates of both reusable bottles and eco-bags were around 80%. At first glance, this number suggests that eco-bags may have a positive impact on the environment. However, when comparing the effects of these two products, I found that reusable bottles can reduce carbon dioxide emissions to about one-ninth of that produced by plastic bottles after 100 uses, while eco-bags become more environmentally friendly than plastic bags only after more than 52 uses.From these results, I thought that relying only on eco-friendly products may not be very effective in reducing plastic waste. However, since reusable bottles and eco-bags can produce environmental benefits when used continuously, I would like to consider ways to encourage people to use them more regularly.

3-2 Discussion（考察）

It became clear that simply producing and developing on a global scale cannot solve environmental problems. Rather than focusing solely on the production of biodegradable plastics, I wanted to also focus on processing methods. Since I learned that composting them produces high-quality organic fertilizer, I speculated that effectively utilizing this fertilizer could potentially solve the pricing issue of biodegradable plastics. Furthermore, I considered that replacing plastic products, which easily impact the natural environment, with biodegradable plastics could have a significant impact on solving environmental problems.

4. Conclusion and Future Prospects

I would like to propose the global production and development of “biomass plastics.” As the name suggests, biomass plastics are alternatives to conventional plastics and are made from natural materials such as corn and sugarcane. Recently, products like rice-based straws have become popular, and these can also be considered forms of biomass plastics.One advantage of biomass plastics is that even if they are discarded outdoors or in the ocean, they decompose quickly because soil microbes and some marine organisms can break them down. Earlier, I mentioned that eco-bags have a negative environmental impact if they are thrown away after fewer than 52 uses, but biomass-plastic bags are expected to have less environmental impact because they decompose more quickly even when discarded. Another benefit is that they can be used with a quality closer to conventional plastic compared to substitutes like paper.However, biomass plastics also have disadvantages. One major issue is the cost of production, which is 1.5 to 5 times higher than that of petroleum-based plastics. But if biomass plastics are produced on a global scale, the cost is expected to decrease in the long term. In terms of development, international cooperation—such as learning from each country’s technology or engaging in joint development—could expand the applications of biomass plastics. This is because biomass plastics rely on natural resources, and some plants cannot be produced in certain regions. In countries with low food self-sufficiency, it may also be difficult to freely develop or produce biomass plastics. Therefore, global cooperation in producing and developing biomass plastics is expected to bring many advantages.As for proposals related to reusable bottles, I believe it would be effective for cafes and other beverage-focused establishments to improve services that encourage customers to use their own bottles. For example, offering discounts for using reusable bottles or increasing the availability of water dispensers could be helpful. For eco-bags, possible measures include raising the price of plastic bags slightly or offering discounts on products when customers use eco-bags.In future research, I would like to investigate the environmental issues that may arise during the production of biomass plastics, the sources of development costs, the current spread and production costs of biomass plastics, and how countries with low food self-sufficiency can balance food supply and biomass plastic production. I would also like to explore whether biomass plastics can be used not only as substitutes for everyday plastic products but also in other areas.We must minimize our plastic waste going forward. To do so, it is important that we carry eco-friendly products and avoid purchasing items made of plastic whenever possible.

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Improving International Relations Through Sports

～International Exchange Through Sports～

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Abstract

Currently, there are several countries where conflicts have intensified or become prolonged, making it difficult for people to engage in sports activities.In this study, I proposed the hypothesis that organizing sports tournaments for young people in conflict regions could help improve relationships between those areas.To examine this hypothesis, I searched for previous research and relevant case studies available on the Internet and analyzed them.As a final conclusion, I suggest that governments and corporations should provide financial support to hold such sports tournaments and conduct exchange events afterward.

1. Introduction (Background, Significance, and Purpose)

1-1. Social Context (Current Situation and Problems)

In 2024, the Paris Olympics were held, and international sports events gained a lot of attention. I like both playing and watching sports, but I realized that because of the war in Ukraine caused by Russia and the conflict in Palestine, there are people who cannot enjoy sports even if they want to. That is why I chose this theme.There is something called the “Olympic Truce,” which calls for a ceasefire during the Olympic Games and seven days before and after. Although it has no legal power, Russia has broken it twice in the past. If the invasion of Ukraine continues, this will be the third time. Because of this, the IOC (International Olympic Committee) cannot ignore Russia’s actions. As a result, Russia and its ally Belarus have been banned from several competitions. Therefore, Russian athletes cannot participate as “Russia” in the Olympics; they compete under the IOC instead.On the other hand, many Ukrainian athletes cannot practice in their home country because of the war. Some of them have evacuated to other countries, such as Japan, to continue their training. There are still many regions in the world where wars and conflicts continue. From this, we can see that it is difficult for everyone to enjoy sports safely today.

1-2. Previous Research

In a 2016 case by JICA, South Sudan, which became independent in 2011 after nearly half a century of civil war, continued to face political and ethnic conflicts even after independence. Therefore, JICA, in cooperation with the Ministry of Youth and Sports of South Sudan, started organizing the “National Unity Day” (a national sports event) in 2016. The purpose was to convey to the young generation—the future leaders of the country—the importance of overcoming ethnic divisions and building trust and unity among citizens through sports.Since the first event, it has been held once a year, and during the event, many opportunities for young people from different ethnic groups to interact have been observed.A paper discussing the benefits of “National Unity Day” in South Sudan examined the sustainability of its positive effects by comparing athletes who participated for the first time with those who had previous experience. Data were collected through questionnaires and interviews. The results showed that athletes who had participated in NUD before had statistically lower emotional

barriers and higher levels of trust toward other ethnic groups than first-time participants.Furthermore, the study revealed that even after the event ended, the athletes continued their activities as “messengers of peace.” Specifically, they shared their experiences and the importance of peace with friends, families, and local communities, and spread the message through radio and other media. Regarding the sustainability of the NUD’s impact, the research found that participants maintained the friendships, trust, and social networks they built during the event and made efforts to extend these positive effects within their communities.In other words, the effects of NUD were not temporary but continued even after the event. Because the sustainability of these effects was confirmed, the paper concluded that sports events should be considered a means of peacebuilding, and that continuing to hold NUD in the future is important for strengthening social unity in South Sudan.

According to the study conducted in Ethiopia,Alemayehu studied how sport helped peacebuilding before, during, and after the conflict in northern Ethiopia. He used interviews with government sport officers to learn how sport was used in communities, policies, and sport organizations. The study found that sport can create safe places where different groups can meet, talk, and rebuild trust. It can help people understand each other after conflict. However, during the conflict, sport was sometimes used for political purposes, which made tensions worse. The study shows that sport has good effects, such as building trust and supporting community healing, but also risks, like being used for politics or creating unfair situations. To use sport for peace, strong support, fair rules, and long-term planning are necessary.

From these previous examples, I thought that holding sports tournaments and exchange events between conflicting ethnic groups or nations—or between groups that wish to build stronger mutual trust—would be very beneficial. However, since traveling between countries for such events would require high travel costs, it may be difficult to hold them frequently in a short period of time. Therefore, I believe that this issue needs to be improved in the future.

1-3. Research Question (RQ)

Currently, there are many conflicts between countries and ethnic groups. Previous studies have shown that even among conflicting ethnic groups, engaging in sports exchanges can lower barriers and increase mutual trust. Therefore, I thought that playing sports and interacting beyond national or ethnic conflicts could help improve international relations. Based on this idea, I set my research question as: “What benefits does participating in sports bring to international relations?”

1-4. Hypothesis

I made two hypotheses.The first hypothesis is to hold a sports event by using ideas from international events and past examples. In this event, young people from two groups or countries in conflict play on mixed teams. By mixing the members when forming the teams, I think they will have more chances to cooperate and communicate. To examine this hypothesis, I will look at earlier studies and list their advantages.The second hypothesis is to set a break time during each game. During this break, team members can talk and make plans together to win.From these two hypotheses, my

temporary answer to the research question is: “Hold a sports event where young people under 18 from the two countries or regions join and interact with each other.”

2. Research Method

I searched the internet and looked at several previous studies, then compared them. I compared the South Sudan case from the earlier research with another study about sports exchange in Cambodia.In the Cambodia study, the goal was to check the results of the Siem Reap Hotel Football League (SHFL). The researchers interviewed 40 people from 2007 to 2010.The study found that SHFL helped people build friendships, respect, and teamwork. It also helped hotel workers and hotels create good relationships. Even when the economy was difficult, participants were happy to join the league because it gave them a chance to work together toward their goals.SHFL also worked with the local education office to support social development. Members believed that sports could improve local life and the environment, especially through tourism.The study also said that important ideas for social development are “spontaneity,” “independence,” and “grassroots activities.” SHFL was a good example of people taking the initiative to develop their society through sports.I organized and compared the differences and results from these studies in an easy-to-understand way.

3. Results and Discussion

3-1 Results

A study in South Sudan, surveys of the tournament participants showed that many of them felt less worried about other ethnic groups and even made new friends. This means the tournament helped build trust between different groups. However, because the tournament is short, the study also found that long-term support, such as education and community programs, is needed to keep the positive effects.

A study in Ethiopia also showed that sports events can create chances for dialogue and cooperation, and can help reduce tension between groups that were in conflict. But the study warned that sports events might be used for political purposes, which can weaken their peacebuilding effect. It also found that if only certain groups join the events, fairness is lost and the positive impact becomes smaller.

3-2 Discussion

Based on previous studies, I am considering holding a sports event once a year for people under the age of eighteen. Earlier research on South Sudan’s National Unity Day sports event shows that people who have participated before change the way they think about and interact with members of other ethnic groups. It has been found that those with prior experience in the event have a higher level of

trust toward people from other groups than first-time participants.At the National Unity Day event, team sports such as soccer and basketball are played. It is thought that cooperating with teammates from different ethnic groups helps increase mutual trust. Since its first year, the event has been held annually, and the number of sports has continued to grow. All of these sports are chosen because they are easy to set up and clean up.Considering these points, I think that using soccer for the tournament is the best option, because it is a team sport and very easy to prepare. For example, cones or lines can be used to mark goal areas or the boundaries of the field. These markers are simple to remove, and no special facilities are required.However, simply offering sports and interaction may not be enough to attract participants. Therefore, I think it is effective to provide sports,interaction , and free meals together. If meals are offered for free, more people may be willing to join.When gathering participants for the event, it is important to select the same number of people from each region or ethnic group. Previous studies show that if fairness is not ensured, distrust between groups may increase rather than decrease. For this reason, each sport should have a fixed number of participants from every group, so that no group has an advantage in numbers.Alemayehu studied how sport helped peacebuilding before, during, and after the conflict in northern Ethiopia. He used interviews with government sport officers to learn how sport was used in communities, policies, and sport organizations. The study found that sport can create safe places where different groups can meet, talk, and rebuild trust. It can help people understand each other after conflict. However, during the conflict, sport was sometimes used for political purposes, which made tensions worse. The study shows that sport has good effects, such as building trust and supporting community healing, but also risks, like being used for politics or creating unfair situations. To use sport for peace, strong support, fair rules, and long-term planning are necessary.According to the study conducted in Ethiopia,

4. Conclusion and Future Prospects

In conclusion, I would like to propose my idea to an NGO. My proposal is to hold a sports event in which ordinary people under the age of 18 from regions in conflict, either for ethnic or political reasons, can participate. I believe that this event can make good use of the findings from earlier studies and create more opportunities for young people from different regions to interact through sports and to talk with one another.I also think that if young people communicate and build connections now, they may be able to form better relationships when they become adults and take important roles in society. As a future plan, I hope to create an environment where people under 18 can join such events more easily.

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