

Integrated Analysis of the Implementation of the
Transformative Ocean Science to the Social System:
The Study on Blue Seafood Guide for
Seafood Sustainability

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Abstract

Marine fish stocks have declined globally over the past half-century, and raising awareness of sustainable fisheries and seafood consumption has become a critical issue. Japanese government revised the fisheries law in 2018, which was implemented in 2020, and the other new law to prevent illegal, unreported and unregulated (IUU) fishing was implemented in December 2022. Japanese fisheries are in the crucial transitional period to aim at sustainable and managed fisheries. Before legal infrastructure development, the Blue Seafood Guide (BSG) was launched as Japan's first sustainable seafood rating program in 2013 with limited fisheries data. In 2018, an original science-based methodology was incorporated into the guide to balancing scientific rigor against the data deficiencies inherent in common Japanese management practices, including a need for sufficient output control and catch information.

Chapter 1 explains the general definitions and circumstances for a sustainable fishery. Overfishing is a global issue, and the condition in Japan is worse than the global average. FAO guides the definition of sustainable seafood in the Code of Conduct for Sustainable Fisheries. Adams stated the pillars of sustainability: economic growth, environmental protection, and social development. As the social implementation of sustainable seafood consumption, fisheries certificates and rating programs have been developed, but sustainable seafood consumption still needs to be improved.

How sustainable fisheries and seafood consumption can be achieved in countries like Japan remains questionable. Ostrom stated that governance is frequently an adaptive process involving multiple actors at diverse levels. Pauly explained that sustainability occurred when fish populations were naturally protected by having a large part of their distribution outside the range of fishing operations. Hilborn et al. argued against a purely ecological focus on sustainability, and a socioecological perspective is needed and effective to cope with global change. Makino stated that Marine science must be significantly upgraded. In 2018, the UN proclaimed a Decade of Ocean Science for Sustainable Development. Implementing transformative ocean science is crucial for sustainable seafood consumption to create a sustainable future.

Chapter 2 aims to illustrate why and how the BSG was developed to best suit Japan's insufficient data infrastructure to raise awareness around sustainable seafood consumption. Also, it explains how the BSG attempted to create a nexus between fishery certificates and rating programs. The BSG focuses on the nexus of science and policy and seeks to establish collaboration between certification and rating programs to accomplish its mission of encouraging sustainable seafood consumption positively. This chapter also summarized BSG's implementation activities for awareness rising in Japan. The perspectives of those who intend to develop seafood rating programs in other countries or areas similar to Japan are demonstrated.

Chapter 3 identifies the reason for Japan's low awareness of seafood sustainability and states the necessary actions to increase sustainable seafood consumption. The proactive stakeholders in seafood supply were surveyed to determine the current status of sustainable seafood sales. Marine Stewardship Council (MSC) certified fishers and MSC's Chain-of-Custody (CoC) certification holders answered the questionnaires. Certified fishers showed a positive attitude, citing proactive sales channel expansions and contributions to sustainability. Certified distributors were primarily passive, mainly because they obtained the certification at the request of their clients, and about half of them did not disseminate information between consumers and suppliers. The stages of the awareness of producers, intermediary trade and retailers are different and must align. Therefore, if the supply chain stakeholders proactively educate themselves, choose sustainable products from the fishers, and pass the sustainability information to the consumers, sustainable seafood consumption would progress.

Chapter 4 maps the stakeholders involved in seafood sustainability and specifies their characteristics. The stakeholders are divided into the following categories: Government /politicians, Administration/fisheries agency, Local governments, Industry associations, Fishers, Business sectors in the seafood supply chain, Businesses other than the fisheries industry, Consumers, Scientists and academia, Media, Foundations/donors/sponsors/partners, International organizations and NGOs. This chapter points out each stakeholder's current status and challenges in addressing the improvement of seafood sustainability.

Chapter 5 concludes the dissertation. It identifies that the social implementation of transformative ocean science becomes possible by understanding the nature of society surrounding seafood sustainability. The scientific value of sustainable seafood programs and the situation in which

each social group interprets the facts with their small science is clarified, which is their interest to analyze who is thinking what and acting with what logic. The BSG has created a mechanism for all stakeholders to come on board. In other words, it is a comprehensive initiative with a co-evolution mechanism. Utilizing the results of those complex sciences is a new approach to ocean science unique to the BSG.

Table of abbreviations

Abbreviation	Definition
ASC	Aquaculture Stewardship Council
BBB	Blue seafood Beauty Book
B-limit	Limit reference point for spawning stock biomass
BSG	Blue Seafood Guide
CoC	Chain-of-Custody
CRC	Certification and Ratings Collaboration
DHA	Docosahexaenoic acid
EEZ	Exclusive Economic Zone
EPA	Eicosapentaenoic acid
ESG	Environmental, Social, and Governance
ETP	Endangered, Threatened and Protected
EU	European Union
FAJ	Fisheries Agency of Japan
FAO	Food and Agriculture Organization
FCA	Fishing Cooperative Associations
FIP	Fisheries Improvement Program
G20	The Group of Twenty
GSSI	Global Sustainable Seafood Initiative
HCR	Harvest Control Rules
IQ	Individual Quota
IUCN	International Union for Conservation of Nature and Natural Resources
IUU	Illegal, unreported, and unregulated
JF	Japan Fisheries Cooperatives
JFA	Japan Fisheries Association
JFRCA	Japan Fisheries Resource Conservation Association
LDP	Liberal Democratic Party
LRP	Limit reference point
MAFF	Ministry of Agriculture, Forestry and Fisheries
MEL	Marine Ecolabel
MELV2	Marine Eco Label Version 2
MOEJ	Ministry of the Environment Japan

Abbreviation	Definition
MSC	Marine Stewardship Council
MSY	Maximum sustainable yield
NGO	Non-Governmental Organization
NOAA	National Oceanic and Atmospheric Administration
PEW	PEW Charitable Fund
RAT	Rapid assessment tool
RRPC	Regulatory Reform Promotion Council
SA	Stakeholder analysis
SDG	Sustainable Development Goal
SeaBOS	Seafood Business for Ocean Stewardship
SFSJ	Sailors for the Sea Japan
SM	Stakeholder mapping
SNS	Social Networking Service
SW	Seafood Watch
TAC	Total Allowable Catch
TICAD	Tokyo International Conference on African Development
TMG	Tokyo Metropolitan Government
Tokyo2020	Tokyo 2020 Olympic and Paralympic Games
TRP	Target reference points
UH	Usufuku Honten
UN	United Nations
UNDOS	Decade of Ocean Science for Sustainable Development
USA	United States of America
WTO	World Trade Organization
WWF	World Wildlife Fund

Chapter 1

Introduction

1.1 Background

1.1.1 Depletion of fisheries resources

The marine environment has been damaged since the late 20th century. Fish stocks have globally declined over the past half century and the stock status in Japanese waters is worse than the world's average. Therefore, raising awareness of sustainable fisheries and seafood consumption has become a critical issue. The Food and Agriculture Organization (FAO) of the United Nations (UN) warns that the percentage of stocks fished at biologically unsustainable levels has increased from 10% in 1974 to 35.4% in 2019 (Figure 1.1). In contrast, the Fisheries Agency of Japan (FAJ) reported that over 50% of fisheries resources in Japanese waters have been at a low level for over 20 years (Figure 1.2).

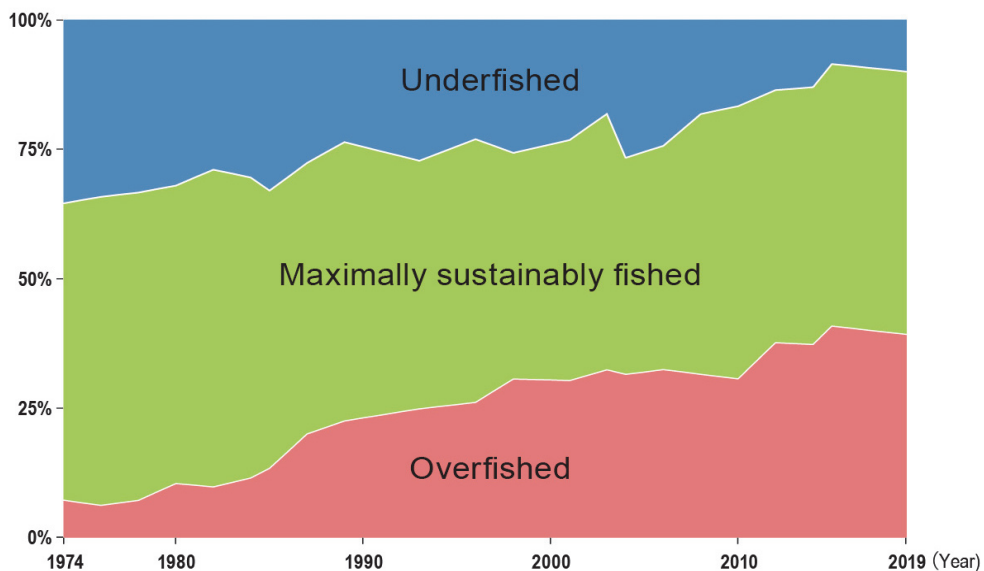


Figure 1.1. Global trends in the state of the world's marine stocks from 1974–2019 [1]. The Figure was generated by the author from the FAO (2022).

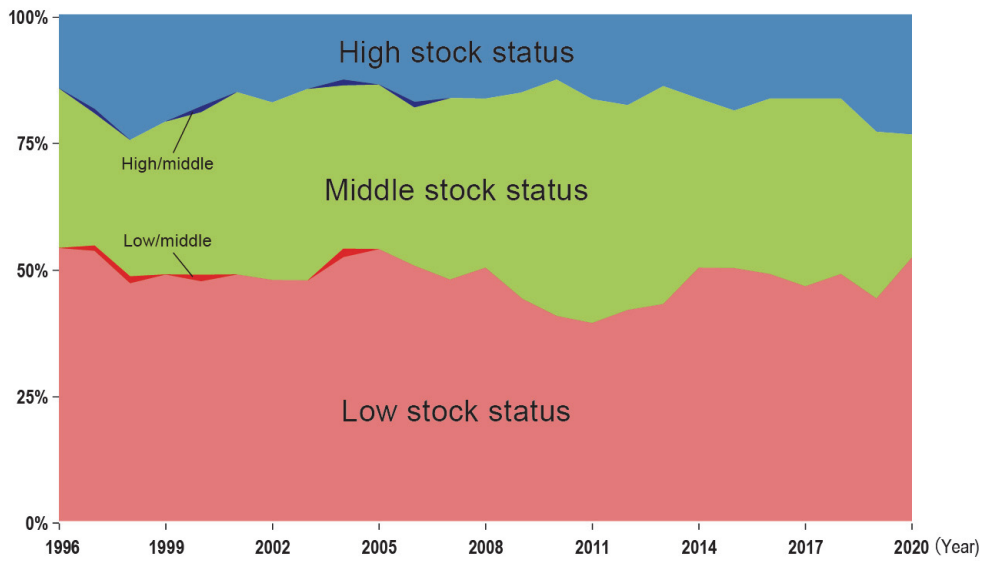


Figure 1.2. Status and trends of fisheries resources in the waters surrounding Japan (43 species and 67 stock groups) [2]. The Figure was generated by the author from the FAJ (2021).

The fisheries industry, despite being a growing industry in the world, has been derided as a declining industry in Japan [3]. World fisheries production has increased since the 1990s while Japan's production was decreasing (Figures 1.3 and 1.4).

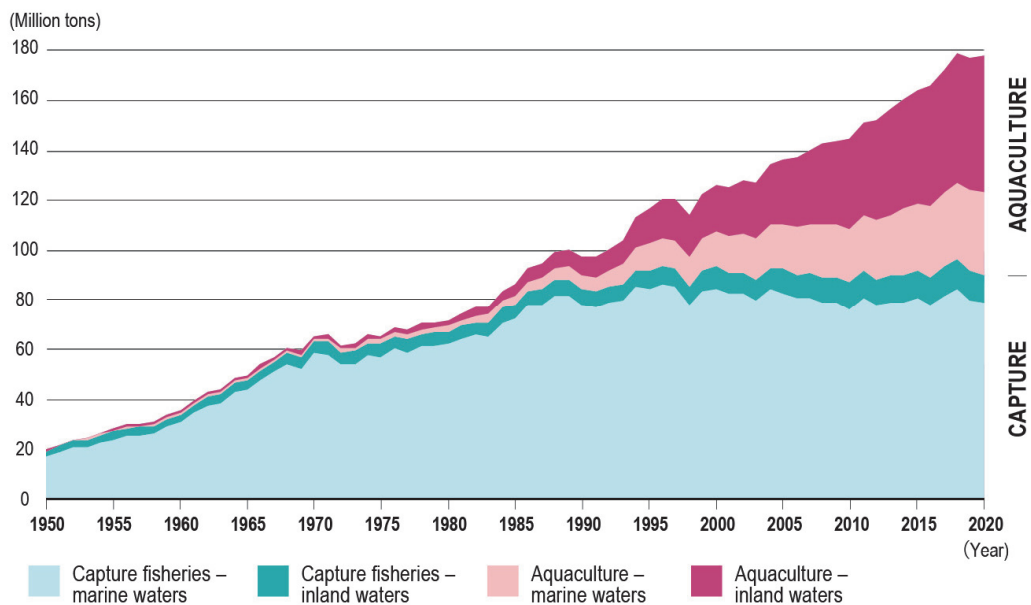


Figure 1.3. World capture fisheries and aquaculture production [4]. The Figure was generated by the author from the FAO (2022).

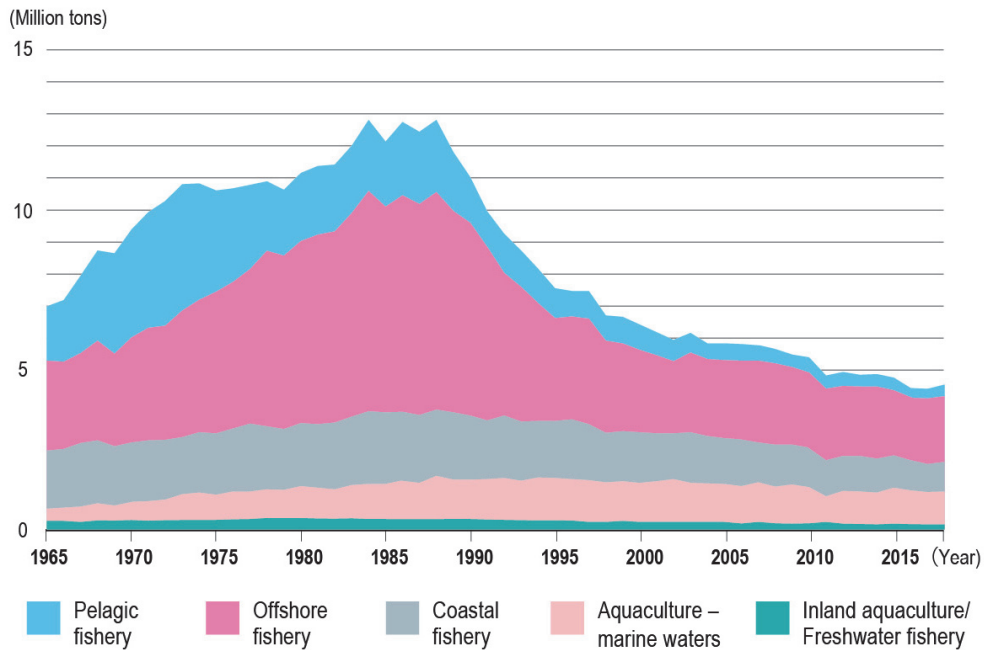


Figure 1.4. “Trends in Japan's fisheries production and changes in the situation surrounding the fisheries industry” [5]. The Figure was generated by the author from the FAJ.

In addition, the FAO reported that Japan marked low scores in SDG 14 in the Sustainable Development Report 2022 [6]. The major challenges remain in the following categories: "fish caught from overexploited or collapsed stocks," "marine biodiversity threats embodied in imports," and "marine waters under national jurisdictions contaminated by chemicals, excessive nutrients (eutrophication), human pathogens, and trash" (Figure 1.5).



Figure 1.5. Sustainable Development Report 2022, Cambridge University Press (2022) [6].

1.1.2 Global movement for transformative ocean science led by the United Nations

In 2018, the UN proclaimed a Decade of Ocean Science for Sustainable Development (UNDOS) (2021–2030) [7] to address the dreadful state of the ocean for humanity.

In 2019, the FAO announced the concept of strengthening the science-policy nexus at the International symposium on fisheries sustainability to strengthen the science and policy interplay in fisheries production, management, and trade based on solid sustainability principles for improved global outcomes on the ground [8].

In 2022, FAO announced and published Blue Transformation which provides the road toward aquatic food systems for 2022–2030. This roadmap for Blue Transformation aligns with the 2021 Declaration for Sustainable Fisheries and Aquaculture of the Committee on Fisheries (COFI) of FAO's Strategic Framework 2022–2031. It focuses on the elements that maximize the contribution of aquatic food systems to the SDGs [9]. In 2021, UNDOS Japan stated “Industry-government-academia-private collaboration in the field of marine science is not always sufficient. The United Nations Decade of Ocean Science is not to be implemented solely by marine scientists, but is aimed at co-design, co-production, and co-delivery in collaboration with various stakeholders.”[10]

UNDOS' initiative advocates transformative ocean science. Science should face the challenges in society rather than exist alone, and science which is transformative to society should be highly important. Österblom et al. suggest that marine ecosystem scientists need to actively: Prepare for the unexpected, cross boundaries, and understand our cognitive limitations to further develop the exciting field of marine ecosystem science.[11] Makino stated that Marine science must be significantly upgraded so that it can detect and diagnose problems, and also directly contribute to their solution in order to help achieve the SDGs and the common goals of humanity through sustainable development of the oceans [12]. Also, it is imperative that we get to the end of the Decade with a new way of carrying out marine science involving a transdisciplinary approach that is financially sustainable and fit for purpose.[7]

What is transformative ocean science? It is comprehensive and transdisciplinary ocean science that can transform society to be truly sustainable through the collective wisdom of various fields of science and knowledge that deepens our understanding of the oceans, which helps society to overcome its urgent challenges. The United Nations has made the case that the world needs a transformative ocean science for sustainable fisheries and seafood consumption. [10] UNDOS Japan selected the Blue Seafood Guide (BSG) in 2021 as one of the examples of the implementation of transformative ocean science to the society where the UN Decade of Ocean

Science aims to achieve a sustainable society.[13]

1.1.3 Global movement for sustainable fisheries

The FAO announced The Code of Conduct for Responsible Fisheries (the Code hereafter) in October 1995, after multiple experiences of fish stock depletion—mainly due to overfishing. It is the first and only international instrument of its type developed for fisheries [14]. Furthermore, it has become a central philosophy of sustainable fisheries and seafood consumption.

Alongside the Code, Adams stated the three pillars of sustainability: economic growth, environmental protection, and social development [15]. Hilborn et al. [16] added, “if a management system can provide food for this generation without reducing the ability of future generations to produce food, let us call that “sustainable seafood.” Pauly explained that sustainability occurred when fish populations were naturally protected by having a large part of their distribution outside the range of fishing operations [17]. Hilborn et al. [16] argued against a purely ecological focus on sustainability. Instead, they reasoned that seafood sustainability (and sustainability more broadly) must take on a socioecological perspective to cope with global change and be effective across cultures, social drivers, and the increasing number of ocean uses.

1.1.4 Development of seafood sustainability programs

In a practical interpretation, many fisheries certificates and rating programs have been developed since the 1990s. The Marine Stewardship Council (MSC) developed the first program with the World Wildlife Foundation (WWF) between 1997–1999. The Fisheries Standard (based around principle 1, assessment of impact on the target species; principle 2, assessment of impact on the ecosystem; and principle 3, assessment of the management system) was developed to require compliance from fisheries and demonstrate that the actual situation in a fishery meets the outcome implied by this intent [18]. Furthermore, Seafood Watch (SW) is the most well-known program developed by the Monterey Bay Aquarium and was introduced in 2000 [19]. It was followed by many other programs, including the Good fish Guide by the Marine Conservation Society of the United Kingdom and Mr. Good Fish by multiple aquariums in the EU. The successes of MSC and SW in the early 2000s demonstrated that these non-governmental intervention models could incentivize change within fisheries [20].

Meanwhile, Hilborn and Hilborn [21] pointed out that “different axes are being ground by different NGOs, keeping the conscientious consumer successfully in the dark as to their motivations”. These programs started to collaborate and standardize to some point in the late

2010s to remove confusion for the consumers and the stakeholders from the varied information and complicated explanations of the principles and concepts. However, a survey showed that less than 10% of Japanese consumers are aware of the fishery ecolabel [22] explains that consumer awareness is still low, and the challenge for sustainable seafood consumption remains challenging.

1.2 Background of the objective region for the study

Japan's fisheries industry consists of approximately 3,000 fishing cooperatives scattered along the Japanese archipelago coast. Japan's fisheries management system is designed to accommodate this small-scale coastal fishing industry; it has earned an international reputation as a co-management system wherein the government and fishermen cooperate in fisheries management [11]. The Fisheries Law of 1901 created exclusive fishing rights for community cooperatives. The Fishing Cooperative Associations (FCA) in each community own their coastal waters, except ports and industrial zones where the central or regional governments control. It sets local fishing regulations for its members, including gear restrictions and time and area closures. The national and regional governments support these FCAs through scientific advice and subsidies. However, recently, the cooperatives seemed to be in trouble, with two-thirds showing a financial loss, and cooperatives are merging [21]. Also, The aging of fishers and the decline in the fishing population are serious problems [23].

Major political solutions were presented in 2018 and 2020. The Japanese government made a vigorous change to the fisheries law under the strong, long, and stable Abe administration. The following measures were incorporated in the plan in 2018: resource management based on total allowable catch (TAC), increasing the number of fish species subject to TAC, introducing an Individual Quota (IQ) system, providing support for vessel reductions and compensating for lost time, and strengthening measures against poaching [24]. In addition, the Act on Ensuring the Proper Domestic Distribution and Importation of Specified Aquatic Animals and Plants was legislated to combat illegal, unreported, and unregulated (IUU) fisheries in 2020. The Japanese government has shifted to managed and sustainable fisheries under these new legislations.

1.3 Objectives

Fisheries resources can be sustainable when the fisheries is well managed with appropriate management measures and fishing methods. This paper will discuss the definition of sustainable fisheries, legislation and enforcement to ensure sustainability, and sustainable seafood

distribution through the supply chain. What is needed to realize sustainable fisheries and seafood consumption? Ostrom stated: “Coping with potential tragedies of the commons is never easy and never finished. Now that we know that those who depend on these resources are not forever trapped in situations that will only get worse over time, we need to recognize that governance is frequently an adaptive process involving multiple actors at diverse levels. Such systems look terribly messy and are hard to understand. The scholars' love of tidiness must be resisted. Instead, we need to develop better theories of complex adaptive systems, particularly those that have proved themselves able to utilize renewable natural resources sustainably over time” [25].

This study investigated the challenge and solutions for increasing awareness of sustainable fisheries and seafood consumption to help realize a sustainable society. This included analyzing the missing components required for fishers, the supply chain, and consumers for sustainable seafood consumption in Japan.

There are various challenges for achieving sustainable fishery and seafood consumption in Japan including, 1) The fishery information lacks. Japan has had weaker fishery regulations, and sustainability was not a substantial issue for fishery during the past decades. Therefore, the lack of scientific information has been a challenge for a long time. 2) Suppliers and consumers' awareness for sustainable seafood is low. Fishery certifications and rating programs in the USA have been popular and the market stakeholders regulate themselves by setting sustainable sourcing codes: consumers are aware of the labels and are well educated in the sustainable seafood rating programs. The NGOs are working along with them and Hilborn and Hilborn [21] stated that “Quite simply, NGOs are now among the most important actors in the fisheries management world,” suggesting that NGOs have a responsibility to promote activities like the Blue Seafood Guide (BSG) to improve the sustainability of the seafood industry and the lifestyle of society. However, most parts of the world (including Japan) are not fully prepared to promote the kind of consumer activism widespread in the US and Europe [26]. 3) An awareness of the sustainable role of each of the groups that make up society is not established; therefore, society as a whole has not been strategic, rational, proactive, and collaborative with regard to the sustainable consumption of fisheries resources. The challenge of "How can we achieve together what we can never achieve individually" has just begun [27]. This question poses the challenge of various stakeholders working together to achieve sustainable consumption. 4) Co-management may no longer be the perfect solution for sustainable fishery management, or it may require certain amendment. Ostrom [25] showed multiple successful examples of co-managed fisheries in 1999.

The examples include the Maine lobster fisheries, Pacific salmon in the state of Washington in the USA, and outside of the USA in British Columbia and Mexico. These successes should have proved that sustainable fisheries can be achieved under the co-management system. However, after some twenty years have passed, SW rated Maine lobster "avoid" in 2022 due to stock depletion and poor bycatch management [28]. Also, in Japan, fish stock is depleting, and the fishers are decreasing where co-management has taken place.

This study proves that developing a science-based rating program and its social implementation contributes to realizing the implementation of transformative ocean science in society. This case study may lead to sustainable seafood consumption in countries with similar challenges like Japan, such as southeast Asia. This is the first study revealing the challenge of implementing transformative ocean science in Japanese society.

1.4 Structure of the dissertation

Chapter 2 shows the procedure and challenges from the establishment to the implementation of the BSG, a fishery product rating program that can be considered an implementation experiment for the sustainable use of fishery resources. This is a good sample of a case study that confronts the lack of data and common interest in Japanese fisheries and demonstrates how transformative ocean science can provide solutions to social issues.

Chapter 3 includes an original questionnaire survey conducted for fishers and supply chain companies certified by the MSC, which is included in the BSG. The survey results were examined to identify the challenges and provide potential solutions.

Chapter 4 demonstrated the stakeholder mapping to study the social groups that are required to ensure the seafood sustainability as described in Chapter 2 and 3, and provided examples of social implementation of scientific knowledge based on the concept of transformative ocean science.

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Chapter 2

The Development of “Blue Seafood Guide,” a Sustainable Seafood Rating Program, and its Implication in Japan

2.1 Introduction

Marine fish stocks have declined globally over the past half century, in part due to overfishing and IUU fisheries. The percentage of fish stocks that are within biologically sustainable levels has declined from 90% in 1974 to 65.8% in 2017 [1].

The status of fish stocks in the Japanese Exclusive Economic Zone (EEZ) is worse than the global average. FAJ reported in 2020 that only 23% of stocks evaluated were at a high level, and 53% were at a low level, due to several reasons including overfishing, environmental changes and environmental destructions. Trends in resource volumes from 1996 to 2019 indicate that these resources have not recovered over the past 20 years [2].

The period from 1985 to 2010 saw the transformation of fisheries management around the world [3]. By 2010, major countries including EU countries, North America, Australia, and New Zealand had adopted harvest strategies that specifically reduced exploitation rates as abundance dropped below the biomass needed to produce maximum sustainable yield (MSY). By contrast, such strategies were not adopted in Japan until after a fisheries policy reformation was legislated in 2018 and implemented in December 2020. The purpose of the new policy was expressed in a major amendment to Article 1, which stated, "To ensure the sustainable use of fishery resources". This new policy regulates to adopt MSY based evaluation and Individual Quota, and increase the number of fish species subject to TAC from 60% to 80% (by volume) [4].

Not only the over-catch by the fisher, but IUU fishing is a global problem. According to the FAO, IUU fishing accounts for up to 26 million ton of fish caught annually, or an estimated one in every five fish caught globally, with an annual cost of up to \$23 billion [5]. To combat IUU fishing, the Japanese government will need to implement a catch documentation scheme and import control rules on all seafood products.

Awareness of sustainable seafood consumption among the Japanese public remains low. MSC reported in 2020 that the percentage of Japanese consumers who are aware of fisheries certificates

for sustainable seafood is 22%, as compared to the global average of 41% [6].

The Certification and Ratings Collaboration (CRC), a consortium of seafood certification and ratings programs, holds that fisheries certificates must validate whether a product has been produced/sourced sustainably and complies with the relevant social and chain-of-custody standards. Rating programs, by contrast, rate fished and farmed seafood in key markets to provide information on a full spectrum of low- to high-performing fisheries [7]. The successes in the early 2000s of MSC, a UK-based fisheries certificate program, and SW, a US-based seafood rating program, demonstrated that these models of non-governmental intervention are capable of incentivizing change within fisheries.[8] Whereas European countries and the USA have already adopted multiple rating and certification programs to manage consumer demand for sustainable seafood, the Blue Seafood Guide (BSG) was developed as Japan's first domestic rating program in 2013, and was based on a scientific evaluation method designed to best suit current Japanese fisheries management practices [9].

Further, Swartz et al. stated in 2017 that the seafood certification programs available in Japan; “MSC, with its dependence on foreign seafood sources, and Marine Eco Label-Japan (MEL), exclusively on regulatory compliance, failed to capitalize on Japanese consumer's almost nostalgic attitude toward sustainability as a culturally embedded and community-centric concept. Pride Fish, through still in its infancy, has the potential to capture the consumer support; yet in its current form, the absence of explicit environmental standards prevents the program from becoming an effective tool in attaining fisheries sustainability.” [10]. However, there is no prior studies have examined a seafood sustainability rating program in Japan.

Accordingly, this study claims that the new approach to ratings methodology developed for the BSG balances the need for scientific rigor against the reality of Japan's common management practices, which lack sufficient output control and catch information. It will also help introduce the importance of sustainable fisheries and seafood consumption in Japan and in other countries with similar challenges in achieving seafood sustainability in the future. Further, it presents the possibility of constructing a new rating method based on international experiences and achievements as well as domestic realities and issues in sustainable fisheries resource management.

The purpose of this paper is to illustrate why the BSG was developed for the Japanese market

and to explain how, in the process of development, a methodology was created to best suit Japan's insufficient data infrastructure to raise awareness around sustainable seafood consumption. Thus, this chapter tries to identify how the BSG found a balance between science- based fisheries management displayed in the case of SW in the USA and the Japanese fisheries' management method. This chapter also shows how the BSG attempted to create a nexus between fisheries certificates and rating programs. This new approach to ratings methodology developed for the BSG was intended to balance the need for scientific rigor against the reality of Japan's common management practices, which lack sufficient output control and catch information, and to introduce the importance of sustainable fisheries and seafood consumption in Japan. This is the example of realizing the implementation of transformative ocean science in society.

2.2 Development of the BSG

2.2.1 Background

In order to protect the fishery resources from overfishing and IUU fishing, and promote sustainable fishery, FAO introduced its Code of Conduct for Responsible Fisheries in 1995. Its objectives include establishing principles and criteria for elaborating and implementing national policies for responsible conservation of fisheries resources and fisheries management and development, serving as an instrument of reference, and providing guidance [11]. Based on these guidelines, many fisheries certificates and rating programs have been introduced in various countries.

The first and the most well-known fisheries certificate, which is notable for its strict evaluation criteria, is MSC. In December 1997, after experiencing a dramatic drop in catches due to overfishing, MSC introduced “The Principles and Criteria for Sustainable Fishing” [12]. In early 1996, the World Wildlife Fund and Unilever signed a statement of intent to ensure the long-term viability of global fish populations and the health of the marine ecosystems on which they depend, which would ultimately lead to the establishment of MSC in 1997 and the creation of MSC Fisheries Standard in 1998. The US National Oceanic and Atmospheric Administration released its first annual stock status report for US fisheries in 1997. Furthermore, in 1999, the Monterey Bay Aquarium launched SW to raise consumer awareness about the importance of sustainable seafood production from commercial fisheries and fish-farming operations [13, 14]. These programs have since become an influential factor in seafood sales. Hilborn et al. stated that “NGO guides have become an important force in retailers’ choice of what they will sell and subsequently a powerful tool for marketing particular seafood.” [15].

The BSG was first conceived in the fall of 2012 when David Rockefeller, Jr., the founder of Sailors for the Sea, a US-based NGO for ocean conservation, visited the Narita-san temple in Japan with his wife, Susan. They observed that the temple architecture included numerous fish motifs that reflect the Japanese cultural appreciation of seafood. They worried that, despite their love of seafood, the Japanese public did not seem to have sufficient awareness of the current depletion of fish stocks, especially of Pacific bluefin tuna, which was fast becoming an endangered species (and which did receive endangered-species status in 2014).

Wakamatsu et al. stated that Japanese consumers are not as aware of the fishery resource problems, not because they are not interested in the problems around fishery management, but because they lack the information. [16] In the USA, rating programs were increasingly gaining prominence amongst conservationists, and the most well-known guide was perhaps SW, administered by the Monterey Bay Aquarium [14, 17]. Rockefeller introduced SW to Sailors for the Sea Japan (SFSJ) by showing his SW pocket guide. SFSJ is a Japanese independent ocean conservation NGO established in 2011 with Rockefeller as the honorary chairman and is affiliated with Sailors for the Sea and Oceana, the US NGOs. With the support of The David and Lucile Packard Foundation, SFSJ started work to create the BSG, a domestic rating program in Japan as its scheme owner in 2012.

2.2.2 Procedure for creating the BSG selection rules

2.2.2.1 Phase 1

SFSJ organized a BSG team within their organization with their members and a scientist. They first tried to apply the SW methodology to evaluate species with high stock status according to the official resource assessment data provided by the Government of Japan [18]. All of the evaluations failed because of data deficiencies, such as a lack of harvest control rules and bycatch information. The lack of official reporting of local information such as management measures and catch statistics at the national level has resulted in an overall perception that these fisheries cannot be assessed [19]. One of the reasons for these data deficiencies may be the complexities of Japanese fisheries and their management systems. Japanese fisheries target a wide range of species using various methods and gear. The administrative system also has a complicated way of categorizing types of fishing practices [20].

The BSG team realized that introducing a rating program in Japan would require a unique rating method that follows a science-based approach while taking into account Japan's unique fishery-management practices, large number of target species, and public attitudes toward seafood

consumption.

They prioritized speed in launching the program and decided that the first guide would focus on “relatively abundant” wild species chosen from stock-status data. They decided not to assess aquaculture species because it was unrealistic to assess every aquaculture companies by themselves with limited capacity. Instead, the BSG included the Aquaculture Stewardship Council (ASC) as well as MSC certified fisheries products available in Japan under the category “Internationally-certified sustainable seafood.” The first version of BSG was then introduced to the public in November 2013.

In the following year, the BSG team collaborated with a small group of scientists, attempting to create their original common methodology that could be used by those seeking to evaluate seafood sustainability. The group consisted of university researchers, industry, and NGO members in Japan. They sought to establish a common methodology to standardize Japan’s fisheries evaluation methodology at the international level. They aimed to: (1) Organize and disseminate information on sustainability. (2) Support initiatives such as the Blue Seafood Guide. (3) Specify the challenges for organizing and operating Japan's ratings or certifications programs.

They also aimed to prevent the creation of multiple standards in Japan, which could confuse consumers. The BSG team awaited this group’s findings and was actively involved in their study. However, after a few years of investigation, the group gave up because they could not find the solution under the circumstances of Japan's fisheries management system and the limited fisheries' information.

2.2.2.2 Phase 2

The second phase started in 2017, when the BSG team organized a steering committee and commissioned Ocean Outcomes, an experienced US-based science team, to establish the best available science-based methodology to use for wild-caught fish in Japan. The committee agreed to base their approach on the rapid assessment tool (RAT), based on a select group of especially predictive performance indicators used in MSC, designed to quickly assess fishery. They established exceptions in cases of data deficiency. Also they decided to add SW’s “Best Choice” for "Japan" and "Worldwide", and MSC-certified fishery products to the Blue Seafood Guide.

They decided not to develop a methodology to evaluate aquaculture fisheries because of their limited capacity. Instead, the committee chose to list SW’s “Best Choice” for “Japan” and “Worldwide” aquaculture species available in Japan and ASC-certified aquaculture fisheries as part of the BSG. The list included imported products which cover about 49% of seafood

consumption in Japan.

Thus, the primary development of the BSG selection rules and its original methodology was completed in November 2018. The BSG would list:

1. “Blue Seafood Choice”, evaluated using the original BSG methodology.
2. All domestic and imported MSC- and ASC-certified fisheries and species, available in Japan.
3. SW’s Best Choice for “Japan” and “worldwide”, available in Japan. Figure 2.1 shows the above composition of the BSG.

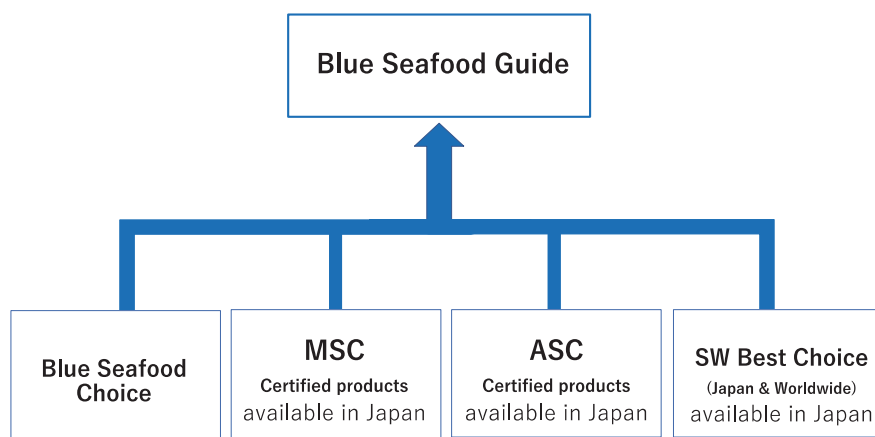


Figure 2.1. Composition of the Blue Seafood Guide with the multiple programs

Figure 2.2 shows the BSG-selected species and how each program that the BSG includes overlaps. These overlaps make some species marked with the logo of multiple programs on the BSG list. The sample image of printed material is shown in Figure 2.3 The BSG team assesses species recognized by the MSC when the MSC certification is not given to the entire fisheries of the region to investigate if the non-MSC products of the area are also recommendable by the BSG.

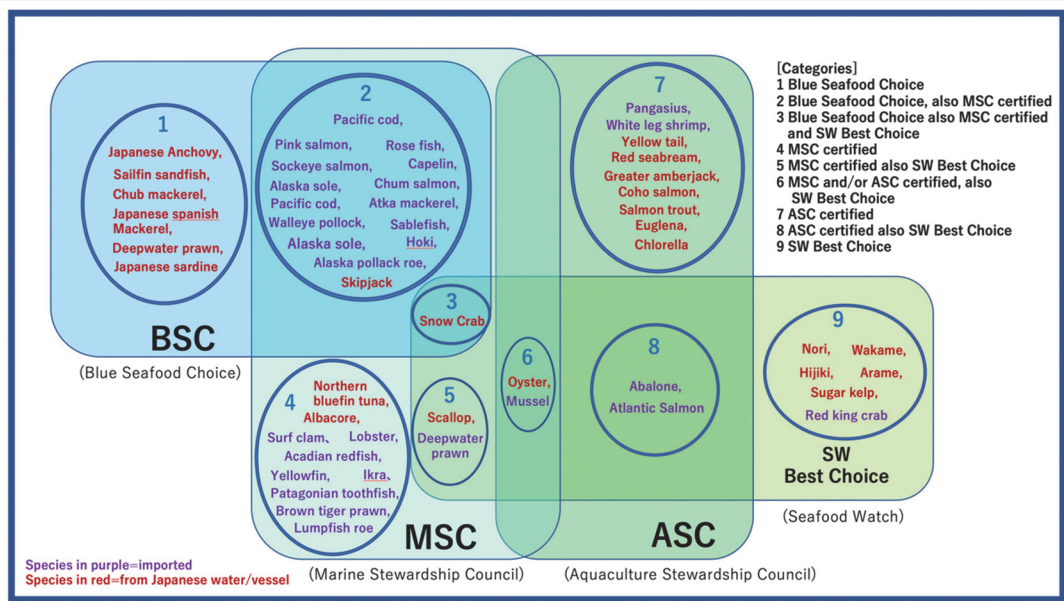


Figure 2.2. Composition of the Blue Seafood Guide and the overlaps of the certificates and rating programs, with the sample species (of Autumn 2020). Species written in purple are imported, and in red are from Japanese water/vessel.



Figure 2.3. Image of the printed material of the Blue Seafood Guide list (2021 version)

2.2.3 The BSG principles, methodology, and evaluation

The BSG is a tool used to evaluate the ecological sustainability of wild-capture fisheries at a broad level. It is primarily based on the RAT co-developed by Ocean Outcomes, World Wildlife Fund for Nature US, and the Sustainable Fisheries Partnership. The RAT uses MSC performance indicators to incorporate some concepts from the Monterey Bay Aquarium SW Fisheries Standard. The BSG methodology aims to be consistent with international guidelines on environmental

sustainability. This includes the Global Seafood Rating Alliance core elements and the Global Sustainable Seafood Initiative Essential Components for fisheries certificate Standards, which are essentially based on FAO Guidelines [21]. Thus, the BSG focuses on the nexus between fisheries certificates and rating programs.

The BSG methodology includes three principles with 25 indicators, as shown in Figure 2.4. This criteria structure is identical to the RAT, which integrates managed and unmanaged non-target species of indicators listed under Principle 2 in the MSC, such that the 28 performance indicators of the MSC are reduced to 25.

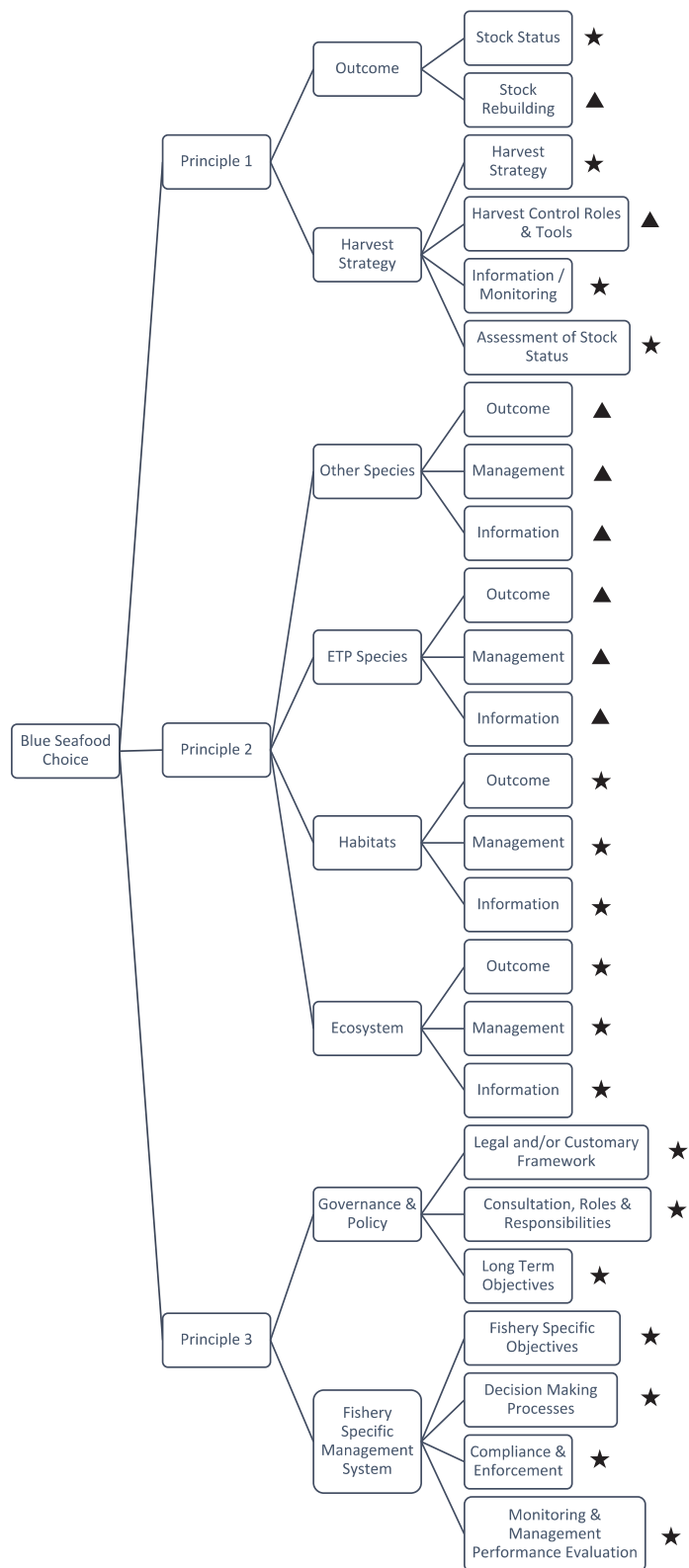


Figure 2.4. Blue Seafood Choice Assessment Criteria Structure, November 2021. For Version1.1, criteria marked ★ were Mandatory and ▲ were suspend in case of lack of information. All became mandatory from Version1.2

Seventeen mandatory indicators were defined for Version 1.0 and 1.1 (those marked with a star in Figure 2.4), with the rest not being mandatory in cases of data deficiency. This was used as a temporary strategy until the necessary data became available. The lack of data was caused by a lack of comprehensive fisheries management under the pre-reform fisheries policies in Japan. The Resource Management Plans (Shigen Kanri Keikaku) mandated for fisheries did not seem to function adequately for the majority of fish resources in Japan. Table 2.1 shows the systemic data and management deficiencies in Japan's fisheries for which the BSG made adjustments in evaluation. BSG team made these adjustments to prioritize the launch of the BSG to introduce the importance of "Sustainability" for fishing, trading, and consumption, as a temporary treatment until the missing data becomes available.

Table 2.1. Systemic data and management deficiencies in Japan's fisheries before the reformed fisheries policy was implemented in 2020.

Description	Relevant indicator(s)	Adjustment made for BSG
Japanese stock assessments do not use MSY-based reference points, even for data-rich fisheries. Stock status reference points are based on historical catch data.	Stock Status	Scoring of Stock Status will consider assessment results based on existing reference points.
Stock rebuilding plans are rare and implemented on a voluntary basis, and are not automatically developed in response to changes in stock status. When rebuilding actions are described, they often focus on enhancement, i.e. production and release of hatchery-produced juveniles, for species where such production is possible.	Stock Rebuilding	This indicator does not have to be scored until the data becomes available
In Japan, fishery stocks are not managed to achieve target reference points (TRPs). There is a stated objective to maintain stocks above a limit reference point (LRP), but if the stock falls below the LRP, recovery actions are not automatically triggered.	Harvest Strategy	The harvest strategy needs to theoretically be capable of achieving management to a TRPs. Some kind of output control, such as a harvest limit or minimum size limit, is required.
Harvest control rules are not developed or used in fisheries management.	Harvest Strategy, Harvest Control Rules & Tools	Lack of HCRs does not automatically result in a red score for Harvest Strategy. Harvest Control Rules and Tools do not have to be scored until the data becomes available
Fishermen are not required to keep records on bycatch or catches of non-target species, so there are usually limited data to determine the other species caught within specific fisheries. Other species caught are sometimes broadly known for certain gear types.	Impact for Habitat: Non-target Species' Outcome, Management & Information	These indicators do not have to be scored until the data becomes available
Fishermen are not required to keep records on encounters or accidental catches of non-fish and ETP species, so there are usually no monitoring data to determine impacts on ETP species. In terms of management, Japan has relevant domestic laws and complies with some international treaties, but fishery-specific measures regarding ETP species are generally	Impact for Habitat: ETP Species' Outcome, Management & Information	These indicators do not have to be scored until the data becomes available

Description	Relevant indicator(s)	Adjustment made for BSG
not documented. Alternative measures are not considered or reviewed.		
Development and publication of fishery or stock-specific management plans is limited. Prefectural governments and fishery coops may publish regulations and resource management guidelines . These are usually specific to prefectures and/or gear types, not necessarily to species.	Management: Fishery Specific Objectives	Publicly available information will be used to score this indicator.

Starting with Version 1.2, issued in November 2020, all indicators became mandatory, following the implementation of the reformed fisheries policy. The policy reforms promoted systematic and sustainable fisheries management by increasing the number of species subject to resource assessment from 50 to 200 and increasing the number of species subject to TAC from 8 to around 15 species, which is helpful for the BSG assessment. Resource Management Plans were replaced by Resource Management Agreements, which would expand the amount of information available from the FAJ and local governments.

The BSG uses the conventional Japanese resource-abundance indicators of high, medium, and low. As the number of species subject to stock assessment in Japan increases and more fisheries target a maximum sustainable yield (MSY), the BSG methodology started to evaluate with MSY-based reference points when available.

The BSG uses the same performance evaluation scale as RAT, with three categories: green/low risk (80 points or more), yellow/medium risk (60 to 79 points), and red/high risk (less than 60 points). Every criterion should meet above 60 points for the BSG. Trained in-house of the SFSJ evaluators conduct evaluations, and a steering committee approves the evaluation results. The BSG chose the rational procedure for screening; if a species is disqualified under Principle 1, it will not be evaluated further with the criteria of Principle 2 and 3. For example, only about 20% of stock abundances were considered high in the stock assessment table issued by the FAJ in 2020; therefore, the BSG team assessed only those species, and the rest of about 80% of the Japanese wild-caught fisheries products were not assessed further. The species that had passed the assessment of Principle 1 but did not pass Principle 2 were rejected prior to the assessment of Principle 3. For example, as the stock status of the Japanese eel is low, the BSG team rejects this species without further assessment. Because the BSG doesn't list any species other than the "Blue Seafood", there is no necessity to evaluate all the species with every criterion.

2.3 Comparison and collaboration with other programs

2.3.1 Comparison with SW

Table 2.2 shows a comparison between the BSG and SW. The most important difference between the two programs is the choice of indicator. Whereas SW uses the three indicator categories of best choice (green), good alternative (yellow), and avoid (red), the BSG uses only a single category (Blue Seafood), which is used to indicate the best choices. This difference is reflective of the spirit of each program. The BSG steering committee interviewed several business sectors in Japan and found that businesses hesitate to accept programs that discourage them from selling certain types of seafood. In the absence of strong public support, they fear losing business opportunities or disappointing their customers by doing so. Additionally, the committee hoped to avoid a problem pointed out by Roheim as follows [17]: Stakeholders have to fight against negative publicity when a product is put on the "red" list. The costs of lost sales and other losses are significant. Also, changing to a sustainable production process is costly. The goal of environmental groups is to create a society where sustainable products are given priority in procurement, but the cost burden of this process is very high.

The committee also noticed a Japanese tendency to dislike negative-pressure campaigns. As a result, the BSG became a uniquely “positive” program that respects Japanese culture and attitudes in the hopes of inviting consumers and businesses to practice sustainable seafood consumption.

The second-most important difference between the two programs is the methodology and evaluation process. SW designates species as “avoid” when data is lacking, whereas the BSG skips the part where data is deficient and evaluates that species with other available information until the lacking information becomes available. For example, information of MSY is limited, so that the BSG evaluates the species with other available information of the stock status. With the recent progress in fisheries policy, the BSG upgraded the evaluation quality to Version 1.2 in November 2020, meaning that every criterion is now being assessed. Assessments are updated once a year, as well as in the leadup to significant BSG events.

Table 2.2. Major differences in the evaluation methodology used in the Blue Seafood Guide (BSG) and Seafood Watch (SW)

Major differences shown in between BSG and SW		
	BSG	SW
Indicators	● Blue= Best choice only	● ● ● Signal (Red=Avoid, Yellow=Alternative, Green=BestChoice)
Methodology	RAT performance indicator, uses MSC methodology	SW original
In case of lack of data	(--) Skip evaluating till data becomes available	● Indicate "Avoid"
Stock status	Use available data	Use MSY
Harvest strategy	X Not evaluated if information is lacking	○ Fishing mortality should be at sustainable level
Bycatch	X Not evaluated if information is lacking	○ Non-target species should be at sustainable level
Management policy and compliance	○ Evaluated	X Not evaluated (Strategies for IUU fishing is assessed)
Negative impacts	X Fisheries unlikely damage the vulnerable habitat	○ Any negative impacts should be avoided

Further details on the differences in the elements of the methodologies used by the BSG and SW are shown in Table 2.3 in Section 3.2.

2.3.2 Collaboration movement of fisheries certificates and rating programs

According to Guanais et al. [22], there are at least 70 certifications and eco-labels and around 200 consumer guides worldwide; they state, “the number of seafood certifications, eco-labels, and consumer guides far outnumbers the diversity of seafood on display in most supermarkets and grocery stores by 2015”. Different organizations may have differing scoring mechanisms by which to evaluate species, the environment, or fishing and aquaculture practices [17]. The perception that these guides do more to confuse consumers than assist them is pervasive [23].

In 2016, SW took the lead in founding the Global Seafood Rating Alliance, which brings the nation’s major rating programs together to establish benchmark criteria that amplify their collective influence and support global seafood buyers. The BSG was invited to join the alliance as a charter member, and 11 programs from 10 countries are members as of 2021. The alliance is working to align the assessment approaches of all member organizations to create consistency across each organization’s individual methodology. The long-term goal is a global standard for seafood sustainability which accommodates unique regional and/or cultural considerations [24].

Fisheries certificates and rating programs started to play complementary roles in 2015, when five programs established the Certification and Ratings Collaboration (CRC) as a forum for collaboration. The CRC is composed of ASC, Fair Trade USA, MSC, SW, and the Sustainable

Fisheries Partnership, and is premised on the assertion that “certification and ratings programs have a common goal of encouraging fisheries and aquaculture to undertake continuous improvement toward environmental sustainability, social responsibility, and economic viability” [25].

One example of the collaboration is seen in SW methodology amended in 2020, written as follows: “For teleost fish and invertebrate species, score inherent vulnerability according to the PSA method described below, adapted from the MSC 2014 with revisions made in 2020” [26], and “Amended Factors 3.3 and 3.4 titles and clarified their contents to distinguish ‘monitoring’ from ‘surveillance’ to be more consistent with the FAO and MSC definitions” [26]. SW answered the author’s inquiry about the reason for the effort; “In an effort to reduce redundancy and confusion in the marketplace, during standard updates/revisions, SW communicates with eco-certification standards to ensure, when appropriate and without lowering the SW sustainability bar, we align on definitions with respect to terms used for impact indicators.”

Table 2.3 shows a comparison of the BSG, MSC, and SW methodologies based on the interview with them. The elements listed reveal the tendencies and characteristics of each program. Common mandatory elements are shown mainly at Target Stock Management; Non-Target Stock Management; and Endangered, Threatened, and Protected Species Management. It indicates that SW is less focused on the Fishery Management System and Governance categories than is MSC and the BSG. This shows the challenges facing efforts to increase the impact of fisheries certificates and rating programs by further enhancing collaboration between them.

Table 2.3. Comparative chart of the elements of the methodologies used by the Marine Stewardship Council (MSC), Seafood Watch (SW), and the Blue Seafood Guide (BSG).

The summary of scheme overlap at the element level between BSG, MSC, and SW				
Color indication		Applied	Not applied	Suspendable*
Components	Elements	Schemes		
		BSG	MSC	SW
1 Target Stock Management				
Impact Management	Harvest Control Rules & Management Tools	Applied	Not applied	Suspendable
	Rebuilding Timeframes	Applied	Not applied	Suspendable
	Stock Recovery Strategies	Applied	Not applied	Suspendable
	Setting Catch Limits	Not applied	Not applied	Suspendable
	Harvest Strategy Implementation	Applied	Not applied	Suspendable
	Harvest Strategy Performance	Applied	Not applied	Suspendable
	Use of Scientific Advice	Not applied	Not applied	Suspendable
Information	Evidence of Shark Finning	Not applied	Not applied	Suspendable
	Development of HCRs	Applied	Not applied	Suspendable
	Information to Assess Implementation	Applied	Not applied	Suspendable

The summary of scheme overlap at the element level between BSG, MSC, and SW				
Color indication		Applied	Not applied	Suspendable*
Components	Elements	Schemes		
		BSG	MSC	SW
	Review of Alternative Measures			
	Monitoring/Review of Rebuilding Strategies			
2 Non-Target (retained & not-retained) Stock Management				
Impact Management	Strategies & Measures			
	Management Implementation			
	Gear Loss Management			
	Strategy Evaluation			
	Evidence of Shark Finning			
Information	Information to Support Management Strategy			
3 Endangered, Threatened and Protected Species Management				
Impact Management	Strategies & Measures			
	Management Implementation			
	Recovery Strategy			
	Strategy Evaluation			
Information	Information to Support Management Strategy			
4 Habitat Management				
Impact Management	Strategies & Measures			
	Gear-Specific Management			
	Strategy Evaluation			
Information	Information to Support Management Strategy			
5 Ecosystems Management				
Impact Management	Strategies & Measures			
	Spatial Management			
	Gear Loss Management			
	Strategy Evaluation			
Information	Information to Support Management Strategy			
6 Target Stock Status				
Status	Biomass Status			
	Biomass Status (Information-Limited)			
	Fishing Mortality			
	Fishing Mortality (Information-Limited)			
	Low Trophic Level Modifiers			
Information	Status Assessment			
	Stock Assessment Review			
7 Non-Target (retained & not-retained) Stock Status				
Status	Biomass Status			
	Biomass Status (Information-Limited)			
	Fishing Mortality			
Information	Status Assessment			
	Impact Monitoring			
	Life History Information			
8 Endangered, Threatened and Protected Species Status				
Status	Biomass Status			
	Biomass (Information- Limited)			
	Direct Impacts			
	Indirect Impacts			
	National & International Take Limits			

The summary of scheme overlap at the element level between BSG, MSC, and SW				
Color indication		Applied	Not applied	Suspendable*
Components	Elements	Schemes		
		BSG	MSC	SW
Information	Impact Monitoring			
9 Habitat Status				
Status	Impacts			
	Gear-Specific Impacts			
Information	Habitat Types and Locations			
	Impact Monitoring			
	Impact Assessment			
10 Ecosystems Status				
Status	Impacts			
Information	Ecosystem Characterization			
	Impact Monitoring			
	Impact Assessment			
11 Fishery Management System				
Management Planning	Management Objectives			
	Precautionary Approach			
Management System	Management Decision Making			
	Stakeholder Engagement			
	Approach to legal disputes			
Management Review and evaluation	Responsiveness			
	Information Access & Transparency			
	Management System Review			
Compliance	Management Performance Evaluation			
	Information and Monitoring Systems are in place			
	Management System Compliance			
	Sanctions			
12 Governance				
Management Processes	Overarching Requirements for Consultation			
	Decision-Making Processes			
	Defined Roles			
Dispute Resolution	Mechanism for Resolving Disputes			
Policy Compliance	National & International Systems			
	Respect for Rights			
IUU fishing	Strategies			

*When data is not available

2.4 Implementation activities

Fisheries certificates and ratings programs aim to create a movement of sustainable seafood consumption. To this end, MSC, SW and BSG take pragmatic approach to the public such as to carry out various events and promote them through the media. There are ways to approach the audience. This section introduces three categories of such activities; 1. Events and promotion, 2. Media coverage, 3. Social Network Service (SNS) and website.

2.4.1 Events and promotion

Hori et al. stated that the Japanese consumers have some interest in sustainable seafood consumption; however, they might attempt desirable consumption if given sufficient opportunity and motivation [27]. For raising awareness and giving motivation, MSC and ASC Japan host Sustainable Seafood Week every year, and over 60 companies supported the event in 2021. A 1,000 yen equivalent coupon was distributed to 300 people by lottery [28]. SW hosted the Cooking for Solutions event annually from 2002 to 2014 at Monterey Bay Aquarium, where they received around 20,000 people on one weekend with some 120 chefs and local wineries.

In Japan, the BSG team hosts events such as the annual gala with around 350 influencers, including diet members, media, and business leaders: As a result, the politicians became supportive, and the partners increased to 40 restaurants and hotels, 12 seafood supply chains, seven businesses other than the seafood industry, two media sponsors and a university as of November 2021.

Those partners promote sustainable seafood in various ways. Pasco, a major Japanese bakery company, produces Blue Seafood Bread with seaweed which shows the logo and a brief description of BSG on the packages, selling 100,000 packages a day nationwide. Maxcell, an electric company, serves Blue Seafood Lunch at their cafeteria for 4,000 employees. Zushi Marina, a famed resort complex near Tokyo, served Blue Seafood at “Blue Seafood pop-up Restaurant”. Fuji TV broadcasted it for 3 minutes.

Further, the BSG team made comprehensive agreements with the local governments, including Mie prefecture and Tokyo Metropolitan Government, created the regional Mie and Tokyo versions of the BSG. The detail of the regional versions is discussed in Chapter 4.

2.4.2 Media coverage, website and SNS

The event at Zushi Marina discussed in 4.1 was broadcast on Fuji TV and viewed by an audience of around 3.85 million. Nippon TV's director was inspired by the program and featured BSG his exclusive news show for 6 minutes; this program was viewed by an audience of approximately 4.95 million. Further, NHK broadcasted about BSG for 5 minutes three times a day in December 2022; its estimated cumulative total audience was 33.3 million people [29].

The BSG was also promoted online through “official columns” in *Forbes Japan*, a leading magazine for economics, and *25ans*, a leading fashion magazine, to broaden its audience. Each article reached an average of 20,000 to 70,000 readers. Environmental, social, and governance investment is a topic of interest for the readers of *Forbes Japan*, while the readers of *25ans* prefer

charity and regard ocean conservation as “*noblesse oblige*.” Further, Yahoo, the leading search engine in Japan that introduces selected articles as “Yahoo News,” chose every BSG article on *Forbes*. Thus, partnering with different types of magazines helped broaden BSG’s audience.

On the website, fisheries certificates and rating programs introduce their program’s societal context, purpose, criteria, and methodology; provide access to assessment reports; and introduce spin-off programs such as with their recipes and regional information.

The effectiveness of SNS for promotion is growing. Dr. Spring, Chief Conservation and Science Officer of Monterey Bay Aquarium stated that more than one in three American workers are millennials, defined as people born between 1981 and 1997. It is important to engage millennials in their “natural habitat” of digital and social media [30]. Millennials are followed by the generation X, who constitute more than 32% of the global population and are digital natives. SW has 44,202 followers on Twitter, 26,000 followers on Instagram, and 59,300 followers on Facebook. MSC Japan has 26,300 followers on Twitter, 1,040 followers on Instagram, and 6,430 followers on Facebook. In contrast, BSG does not use Twitter and has only 1,000 followers on Instagram and 1,700 followers on Facebook as of November 2021. This suggests that SW takes SNS promotion more seriously than the other programs do.

2.4.3 Spin-off projects

As the BSG project has grown, spin-off projects have been introduced to widen its audience.

BSG has actively concluded comprehensive agreements with local governments. Based on these agreements, BSG has created local government version for the Mie Prefecture and the Tokyo Metropolitan Government. Based on the success of these agreements, plans are underway to create local government versions with Osaka and Hiroshima prefectures in 2023. Chapter 4 will discuss this in detail.

Further, the BSG team developed the *Blue Seafood Beauty Book* (BBB), which targets beauty- and health-conscious consumers. To raise awareness more effectively among the general public, the BBB project was developed to crosses information on beauty and health, which are of high interest to consumers, with information on promoting the consumption of sustainable seafood. The BBB introduces one fish species from the BSG each Monday, along with information on that fish species’ characteristics and sustainability as well as its cosmetic and health benefits. During the first year, the 54 species listed in the BSG were introduced over a period of more than one year. Newly listed fish species are additionally introduced as the BSG is revised each year. This project has value as a new science-based consumer awareness initiative that incorporates the

science of both fisheries and other fields related to beauty and health.

2.5 Discussions and Conclusions

This chapter described how the BSG was developed as the first rating program in Japan by adopting international standards while also meeting the challenges posed by Japanese resource management, data constraints, and commerce culture. It also compared the BSG with other programs and described the attempt to collaborate the programs. Further, it explained how the seafood sustainability programs promote increased dissemination, awareness, and implementation of the guide's recommendations in cooperation with various stakeholders. Visualization and quantitative discussions of behavioral changes are future research topic.

The BSG is facing challenges in implementing its next steps. The lack of fisheries data impedes the development of consumer awareness. As discussed in Grafton et al. [31]: it is also important to avoid information failures and lack of accuracy of passing the information for the buyers and consumers for their sustainable decision.

The BSG has been developed during a historically crucial transitional period for sustainable seafood consumption in Japan. In 2015, UN announced its Sustainable Development Goals, which introduced much of the Japanese public to the term “sustainability” for the first time. In 2020, a major amendment to the Fisheries Act was implemented. This marked a drastic shift from the previously ubiquitous first-come-first-get type of fisheries to the proliferation of more managed fisheries. Furthermore, the government passed new legislation to combat IUU fisheries in 2020, establishing a catch documentation scheme and import-control rules. These new regulations will require all the stakeholders, from the fishers to the retailers, to keep the catch record. These may help improve the quality of data available for fisheries certificate and rating programs.

However, the presence of complex traditional management systems may affect the speed of adoption of new management practices under the latest reforms. As observed by Makino, “the authorities and responsibilities of fisheries management are shared with fishing people and governments and can be categorized as a form of co-management” [20]. Considering the current co-management system was not sufficient to stop fisheries resource degradation and catch decrease over the past 30 years, *Shigen Kanri Kyotei*, or Resource Management Agreement, under the new law is hopeful. FAJ chose seven species (Abalone, Sea-Cucumber and Glass eel for domestic fishery, and Mackerel, Squid, Sardine and Pacific Saury for imported seafood) to implement the catch documentation to start, which should eventually be applied to all the species,

as the EU government has already achieved.

Lack of market demand is also a challenge. Swartz et al. [19] assert that the barriers to seafood certification programs in Japan include a “mismatch with consumer demand”. A survey of consumer preferences in Japan found a strong preference for domestic products and for wild-caught over farmed seafood products [32]. According to Wakabayashi’s survey, 70% of people feel that wild-caught fish tastes better. Three times as many people think wild-caught fish is fresher and twice as many people think it is safer than farmed fish. In addition, Japanese food culture values season and people prefer seasonal wild-caught fish [33]. Also, farmed fish have negative image such as residual drugs, ocean pollution, excessive fat, different texture, and bad smell [34]. Thus, the Japanese government currently mandates labeling to identify countries of origin, whether a product was wild-caught or farmed, and is fresh or was previously frozen [35].

Japanese consumers seem to prioritize easiness for cooking and eating, safety, freshness, locality, and cultural values ahead of sustainability. On the other hand, Uchida et al. [36] suggested that when informed of the perils of the world’s fish stocks, consumers’ willingness to pay for sustainable seafood products increased. There is hope that with increasing awareness, the public will care more about sustainability.

Based on the analysis in this paper, the following are suggested for future development of rating programs in Asia and other countries where lack fishery data or have different fishery systems from those in the EU and the USA.

First, the pilot experiments conducted with the methodologies of existing programs such as MSC and SW, which have a proven track record and a high international reputation, should be operated. This procedure will allow seeing what kind of information is lacking and needed in the target country or region.

Then, study whether some existing programs can be adjustable to suit the region. Alternatively, try to use the existing methodology and lower the bottom bar, making the program relatively tolerant until the area’s fisheries become more data-rich or better managed. It is important to pre-determine the final decision-making procedure. There may be try and error, and they’re often options. Still, the decision has to be made to suit the timeline set for the launch. Otherwise, nothing can be achieved, like the period between phases 1 and 2 that the BSG team went through (see Sections 2.2.1 and 2.2.2).

In addition, when creating a local version, cooperation with local governments is essential, as they most likely have accumulated the primary data. In some regions, the assessment result may be different to the national or international version, depending on the area’s management

condition and different stock status of fish species in the area. This difference was experienced when the BSG team created the Mie Prefecture version of the BSG. For example, Japanese spine lobsters were rated low in the national version but high in the Mie Prefecture version. It is crucial then to disclose the evaluation information to the public so that the audience can learn from the difference.

The scheme owner should determine the program's characteristics by carefully assessing the historical and cultural elements such as national character, localities and food culture of the area. That is because the evaluation is objective, but people's behavior is subjective when receiving the information and the suggestions of the rating programs.

Especially in Asia, where the resource management system is different from Europe and the USA, the fishery may be conducted under a less-than-complete system, or data may not be available or insufficient. Nevertheless, it is crucial to launch first because establishing the rating program itself can be a driving force to improve the national system and consumption behavior.

All rating programs and fisheries certificates should continue to proactively improve their methodology and evaluation procedures in alignment with the regulations. The scheme owners may have opportunities to contribute to the government to improve the policy or help its implementation as they see the challenges and the necessary improvement through the procedure of the development of the program. After all, the sustainable seafood programs' ultimate goal is to raise awareness for sustainable seafood consumption for the social change to protect the oceans for generations to come.

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Chapter 3

Seafood Sustainability Supply Chain Trends and Challenges in Japan: Marine Stewardship Council Fisheries and Chain of Custody Certificates

3.1 Introduction

With the spread of the Sustainable Development Goals (SDGs) concept, sustainability perspectives are being sought for food to address issues such as hunger and food loss, and to achieve carbon neutrality. Sustainable seafood management is one of them [1–3]. For marine environments, various policies, methods, and market mechanisms are being explored to ensure the appropriate use of marine resources by humans. In Japan, such efforts have just begun.

The level of more than half of the fishery resources in Japan is considered to be low, and, in December 2020, the Japanese government enacted the “reformed fisheries policies”. This amendment is a fundamental revision of the Fishery Law, which was enacted in 1949 [4]. Additionally, the “Act on the Optimization of Domestic Distribution of Specified Aquatic Animals and Plants”, the so-called anti-illegal, unreported, and unregulated (IUU) law, was passed in the same month. With these developments, Japan entered a major turning point toward achieving sustainable fisheries and seafood consumption. Following the EU and the USA, the catch documentation scheme will be mandated, which enables the sustainable and effective use of resources and eliminates IUU fisheries. Furthermore, Japan is expected to take international responsibility in contributing to the sustainable development of the fisheries industry in Asia in the future, based on the wisdom and experience of the Japanese-style co-management approach [5].

Japanese private sectors have also promoted sustainable seafood consumption to join the international trend. MSC, internationally certifying sustainable fishers, increased from 2 to 10 fisheries in Japan between 2015 and 2021. The number of distributors that obtained its Chain-of-Custody (CoC) certification has also increased from approximately 80 to 300 companies [6,7]. As of 2022, 14 domestic fisheries have been approved by ASC for farmed fish, and 166 companies have obtained CoC certification [8]. Marine Ecolabel (MEL), a Japanese fisheries certification,

tightened its evaluation criteria to international standards and released Version 2, which was approved by the Global Sustainable Seafood Initiative (GSSI) in December 2019, as were MSC and ASC [9]. SFSJ, the owner of the BSG, Japan's sustainable seafood rating program, became a charter member of the Global Seafood Ratings Alliance. SFSJ has accelerated its activities by establishing comprehensive agreements with local governments, including the Tokyo Metropolitan Government and Mie Prefecture, to create their local version of BSG, and partnered with over 60 companies [10].

Furthermore, three major fishery companies, Nissui, Maruha Nichiro, and Kyokuyo, have joined the Seafood Business for Ocean Stewardship (SeaBOS), an international organization for dialogue and initiatives between scientists and businesses. The movement to promote sustainable seafood has begun to form.

Public awareness and market growth can be accelerated through international official events. In the UK, the procurement of sustainable seafood increased in the wake of the London Olympics [11,12]. The concept of sustainable seafood was seen at Japan-led international events, such as the Tokyo 2020 Olympic and Paralympic Games (Tokyo 2020). At the Eighth Pacific Island Summit in Fukushima in 2018, the Spouse Program symposium on ocean conservation was held [13]. The G20 Osaka Summit 2019 included ending IUU fisheries according to the Summit declaration, in addition to the announcement of Osaka Blue Ocean Vision and the Spouse Program, which followed the same theme [14]. The wife of the Prime Minister hosted the ocean conservation forum at the 2019 United Nation General Assembly [15].

However, these efforts have not yet had an impact on consumer awareness. A survey showed that less than 10% of Japanese consumers are aware of the fishery ecolabel [16]. Hori et al. [17] showed that an environmentally conscious purchasing behavior model for seafood products is structured as follows: social norm evaluation becomes the base variable, influencing evaluations of performance, effectiveness, and feasibility, which become mediating variables, influencing willingness to purchase, and finally leading to purchasing practices.

Enhancing social norm evaluation is important in promoting sustainable seafood purchasing behavior. Although the number of MSC-certified fishers is increasing, only approximately 10 out of the approximately 79,000 fishing companies in Japan are currently certified [18]. Ecolabeling is less prevalent in Asian seafood markets than those in Europe and North America [19].

The purpose of this study is to identify why awareness of sustainable seafood consumption is low in Japan and to propose necessary actions to increase the demand for sustainable seafood. Since the previous studies on consumer awareness regarding sustainability do not address this

question adequately, the paper looks at the different stages of stakeholder awareness in the supply chain associated with the seafood market.

Therefore, the research hypothesis is that the stages of stakeholder awareness in the supply chain (producers, intermediary trade and retailers) are different and are not aligned, so the supply chain does not function to supply sustainable seafood or pass on sustainability information and the value of sustainable products. Therefore, it is vital to enforcing sustainable trade through a transparent and traceable seafood supply chain, realized by the further application of sustainability regulations to the supply chain and the collaboration of stakeholders. If the government supports the sustainable seafood trade, and supply chain stakeholders proactively educate themselves, choose sustainable products from the fishers, and pass the sustainability information to the consumers, sustainable seafood consumption would progress.

This paper categorized supply chain stakeholders into three groups — 1. producers (fishers), 2. upstream distributors (manufacturers and intermediaries), and 3. downstream distributors (sales and restaurants)—and surveyed their respective attitudes.

3.2 Literature review

Is sustainable seafood consumption achievable in Japan? The results of a survey of consumer preferences in Japan by Uchida et al. [20] showed a strong preference for domestic and natural seafood. Wakabayashi [21] compared farmed and wild fish in his survey: 70% of the respondents felt that wild fish tasted better, and twice as many people thought wild fish were safer. The connotations surrounding farmed fish were negative, with concerns regarding residual chemicals, marine pollution, excess fat, and a different texture and bad odor. In addition, Japanese food culture places importance on seasonality [22]. In response to this Japanese preference for domestic products, natural fish, and seasonality, and the demand for information, the Japanese government now requires labels to indicate the country of origin, whether fish are wild or farmed, and whether the product is raw or frozen [23]. According to FAJ statistics [24], consumer requirements for purchasing seafood products include taste, price, freshness, safety, seasonality, nutrition, and health. In addition, according to a survey by the Japan Fisheries Association [25], the key factors that led consumers to eat fish were nutritional intake, such as DHA, EPA, and protein; enjoying the season; and the convenience of processed products. The reasons for avoiding seafood included health-hindering effects such as anisakis, mercury, radiation, and microplastics, and the difficulty of eating fish due to their troublesome bones. The results of a survey by Maruha Nichiro [26] showed the following reasons for avoiding seafood: hard to eat or prepare, generating

waste, hard to clean up, and smelly. However, none of the above statistics mentioned seafood sustainability.

Regarding sustainable seafood purchase behavior, Uchida et al. [27] suggested that consumers are more willing to pay for sustainable seafood when informed of the global seafood crisis. Hori et al. [28] also concluded that Japanese consumer acceptance of the importance of seafood sustainability has increased from 2017 to 2019, although progress has been limited. The results of the MSC [29] survey also showed that, in Japan, the proportion of people who say that they should switch to more sustainable seafood has increased from 49% in 2020 to 61% in 2022. These studies show an increase in consumer demand. Uchida et al. [27] reported that consumers respond to ecolabels only after receiving information on environmental issues, and that consumers show a general lack of awareness. As stated by Togawa [30], consumer decision-making structures are highly complex and large; measures that focus on sustainability alone and expect a change in consumer attitudes are not considered sufficient. Swartz et al. [31] found that the obstacles to seafood certification in Japan are due to a structural mismatch between the certification system and the Japanese domestic fisheries and seafood supply chain.

Pro-sustainable seafood behavior has been studied in western countries. Researchers have found that well-educated, young, and female populations is most likely to be proactive in sustainable seafood consumption. Asche and Bronnmann [32] found that attitudes toward ecolabels vary by market and consumer group. Wessells et al. [33] found that preferences for ecolabels exist in the USA, but vary by race, region, consumer group, and even certification body. Brécard et al. [34] found that a sample of European consumers revealed a tendency for well-educated young women to be the largest market for eco-labeled seafood. Salladarré et al. [35] also found that young, well-educated consumers preferred eco-labeled seafood products in the French market.

Gutierrez and Thornton [36] asserted that seafood ecolabel markets are not driven by consumer demand but by the interactions of social movement, organizations, states, consumers, and companies. Barclay [37] called the sustainable seafood movement a governance concert, where consumers act in concert with other types of actors along the supply chain. Pauly [38] stated that by combining strong legislation mandating the rebuilding of depleted stocks, institutions capable of implementing such legislation, the non-use of destructive fishing methods such as trawls, and the establishment of networks of marine reserves in all countries, it should be possible to set fisheries on a sustainable course. Hilborn explained that an ecological focus alone does not guarantee long-term sustainability of any form, and that a socio-ecological perspective is essential

to seafood sustainability if it is to be effective across cultures and in the future [39]. Socio-ecology describes a sustainable society in which humans and nature coexist in harmony; humans' moderate use of nature is considered essential [40,41]. The summary of the clarifications by the previous studies and the research gaps are shown in Table 3.1.

Table 3.1. Authors contribution table.

Clarifications by the previous studies	Research gaps
<p>Previous studies for the motivation of seafood consumption</p> <ul style="list-style-type: none"> *Strong preference for domestic and natural seafood. (Uchida 2014) *Prefer natural fish than farmed (Wakabayashi 2011) *Taste, price, freshness, safety, seasonality, nutrition, and health. Also nutritional intake and season (FAJ 2022, JF 2022) <p>Raising awareness for seafood sustainability</p> <ul style="list-style-type: none"> * Consumers are more willing to pay for sustainable seafood when informed of the global seafood crisis (Uchida 2013) * Acceptance of the importance of seafood sustainability has increased from 2017 to 2019 (Hori 2020) * Consumers respond to ecolabels only after receiving information on environmental issues, and that consumers show a general lack of awareness.(Uchida 2013) * The obstacles to seafood certification in Japan are due to a structural mismatch between the certification system and the Japanese domestic fisheries and seafood supply chain. (Swartz et al. 2019) * A sample of European consumers revealed a tendency for well-educated young women to be the largest market for eco-labeled seafood. (Brécard et al. 2009) * Seafood ecolabel markets are not driven by consumer demand but by the interactions of social movement, organizations, states, consumers, and companies. (Gutierrez and Thornton 2014) * An ecological focus alone does not guarantee long-term sustainability of any form, and that a socio-ecological perspective is essential to seafood sustainability if it is to be effective across cultures and in the future. (Hilborn, 2015) 	<ul style="list-style-type: none"> *Motivation and hurdles for obtaining MSC and CoC certificate in Japan. *Perspective of supply chain. *Mind of CoC holders. *Differences in the level of awareness of proactive producers and distributors. *Whether there is consistent, mutual distribution of sustainability information among the certified stakeholders. *Whether the MSC and CoC certification is fully used, despite the additional effort and cost. *Where the certificate holders find hurdles: internally and externally.

3.3 Fish stock decline and the definition of sustainable seafood

Marine fish stocks have declined globally over the last half century, in part due to overfishing and IUU fisheries. The percentage of fish stocks that are within biologically sustainable levels has declined from 90% in 1974 to 65.8% in 2017 [42]. The status of fish stocks in the Japanese Exclusive Economic Zone (EEZ) is worse than the global average. The Japanese Fisheries Agency (FAJ) reported in 2020 that only 23% of evaluated stocks were at a high level, and 53% were at a low level [10].

Sustainable Seafood has been defined by the multiple organizations, based on the Code of Conduct of Responsible Fisheries issued by the Food and Agriculture Organization of the United Nations in 1995.

The first and the most notable principles of sustainable fisheries were developed by the World Wildlife Fund and Unilever for MSC certificate, indicating three pillars: 1. stock status of target species, 2. ecosystem conditions, and 3. governance/management conditions [43]. Both fisheries' certificates and the consumer guides for sustainable seafood consumption provide definitions of sustainability. For example, Seafood Watch, a famous seafood rating program, evaluates seafood sustainability based on five criteria: 1. inherent vulnerability, 2. status of stocks, 3. nature of bycatch, 4. habitat and ecosystem effects, and 5. management effectiveness. Iue et al. provided a comparative study of the criteria of the three programs—MSC, Seafood Watch and Blue Seafood Guide—a Japanese sustainable seafood rating program and showed that the style of categorizations are different but the elements of those three programs are shared. All three programs cover the following twelve evaluation criteria: 1. target stock management, 2. non-target stock management, 3. endangered, threatened and protected species management, 4. habitat management, 5. ecosystem management, 6. target stock status, 7. non-target stock status, 8. endangered, threatened and protected species status, 9. habitat status, 10. ecosystem status, 11. fishery management system, and 12. governance [10].

3.4 Materials and methods

3.4.1 Questionnaire survey for producers

The questionnaires were administered to seven MSC-certified fishery companies, which covered all the MSC fisheries certified in Japan as of 2021. All of them answered were answered using Google Forms from 14 to 24 January 2022. The survey asked nine questions, including the reasons for taking on the challenge of MSC certification, the difficulties encountered, the reactions of consumers and business partners after certification, the impact of the Tokyo 2020 and

SDGs, gains and losses from certification, and future challenges for MSC certification (see questionnaire sheet in Appendix A).

3.4.2 Questionnaire survey for distributors

A questionnaire survey was conducted on businesses (322 companies, answered by 98) throughout Japan that have obtained MSC/ASC CoC certification from 17 February to 19 March 2022, in the same manner as the questionnaire for fishers. The questions covered 22 items, including the purpose of obtaining CoC certification, the difficulties encountered, the reactions of consumers and business partners after obtaining certification, the impact of Tokyo 2020 and SDGs, gains and losses from certification, PR status, activities in stores, sales status, pricing, consumer expectations, and requests to the government (see questionnaire sheet in Appendix B).

3.5 Results

3.5.1 Producer attitudes and trends

3.5.1.1 Motivations and difficulties in obtaining certification

All seven target fishers gave valid responses to the questionnaire (Figure 3.1). The majority indicated that their purpose for obtaining MSC certification was to increase both domestic and international products, including market expansion (all companies), increasing domestic competitiveness (six companies), and promoting exports (five companies). The respondents also noted a strong desire to contribute to sustainability (six companies). It is noted that the high aspirations of certified fishers to focus on sustainability while simultaneously growing their own companies. Suzuki stated that the goal of the international certification of fishery products in Japan is to shift domestic fisheries toward sustainability, in line with international standards, and to increase global competitiveness [44]. This survey results showed that the producers recognized both values.

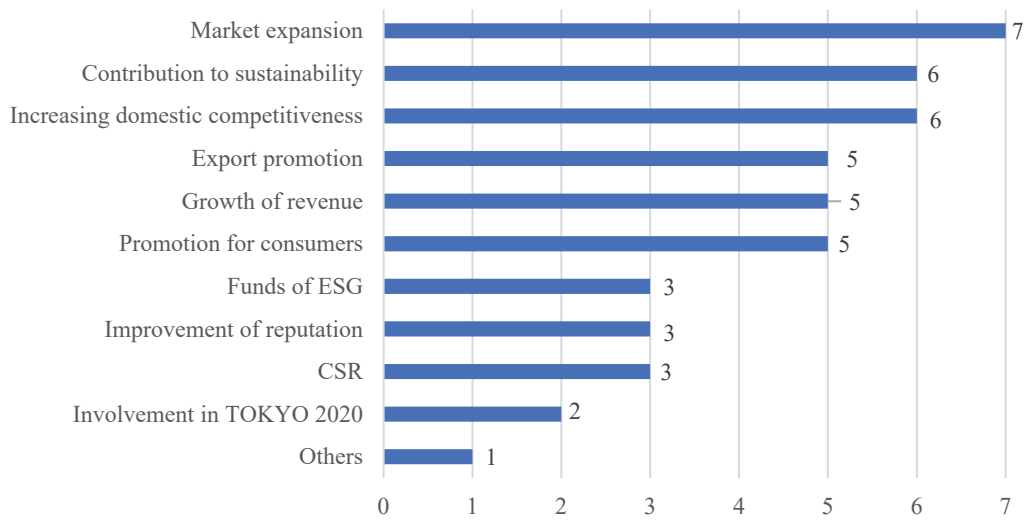


Figure 3.1. Reasons for acquiring MSC certification (multiple-choice answers, n = 7).

The difficulties they encountered in obtaining certification included the complexity of the procedures (six companies), financing (five companies), and language barriers (four companies) (Figure 3.2). In addition to the cost and time burdens, the complex English language documentation and communication with the head office were considerable burdens for applicants.

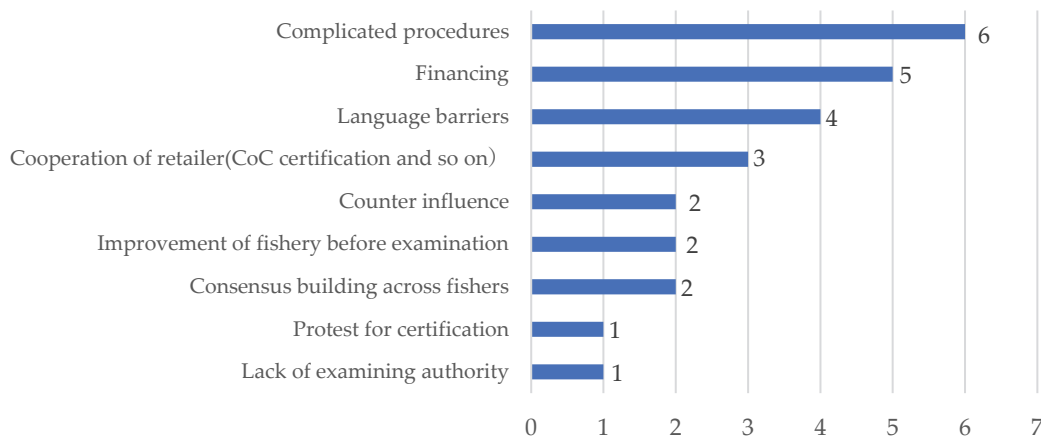


Figure 3.2. Difficulties experienced in obtaining MSC certification (multiple-choice answers, n = 7).

3.5.1.2 Effects of holding certification and influences of international official events

As shown in Figure 3.3, few fisheries (two companies) received a positive response from consumers regarding certification. Conversely, many fisheries (five companies) received a direct

response from clients, and their business partners. Only one company stated that Tokyo 2020 was one of the triggers to obtaining certification in terms of the impact of social conditions, while the majority (four companies) acknowledged the impact of the SDGs (Figure 3.4). Multiple fisheries cited the low price of MSC products as well as the lack of domestic sales channels and the need to raise awareness of MSC certification in the open-ended responses regarding the challenges with MSC certification.

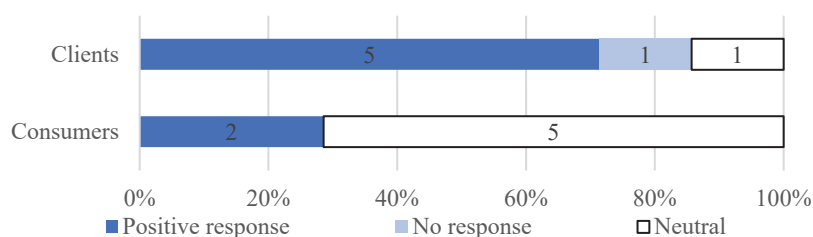


Figure 3.3. Response to MSC certification from clients and consumers (single answer, n = 7).

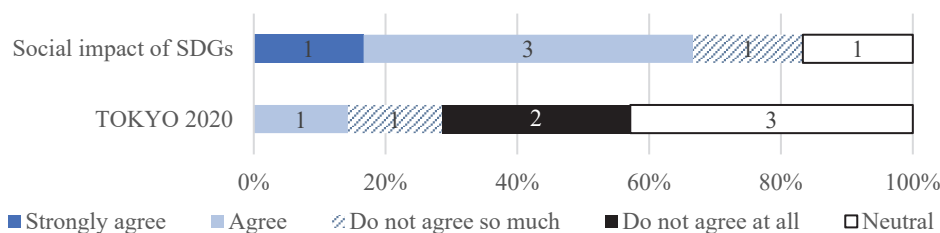


Figure 3.4. Triggers for obtaining MSC certification (single answer, n = 7).

The results of the surveys administered by the Ministry of Agriculture, Forestry and Fisheries (MAFF) in 2017 and 2020 [45,46] showed no change in those three years for the following (Figure 3.5a): reasons for wanting to obtain fishery certification in Japan: “to improve the image to differentiate and add value” (approx. 70%) and “to promote sustainability to consumers” (approx. 50%). Only approx. 20% of respondents wanted to “increase revenues by expanding exports” (with multiple responses). The results of this survey demonstrated the difference between MSC-certified fisheries and fisheries in general. Whereas MSC-certified fisheries aimed at more practical benefits, general fisheries had conceptual objectives, such as image and added value.

A substantial change was identified over those three years in the reasons for not wanting to obtain certification (Figure 3.5b): in 2017, “no need” was the top answer, accounting for approx. 50%, but in 2020, this answer dropped to sixth place, with a proportion of only 6.7%. This result indicated that awareness of the need for fisheries’ certification rapidly increased over the three-

year period. However, more than 40% of the respondents in both groups (2017 and 2020) did not think that acquiring certification would improve sales, with this answer ranking second in 2017 and first in 2020. In summary, although awareness of the need for certification is improving, the price premium is not being realized.

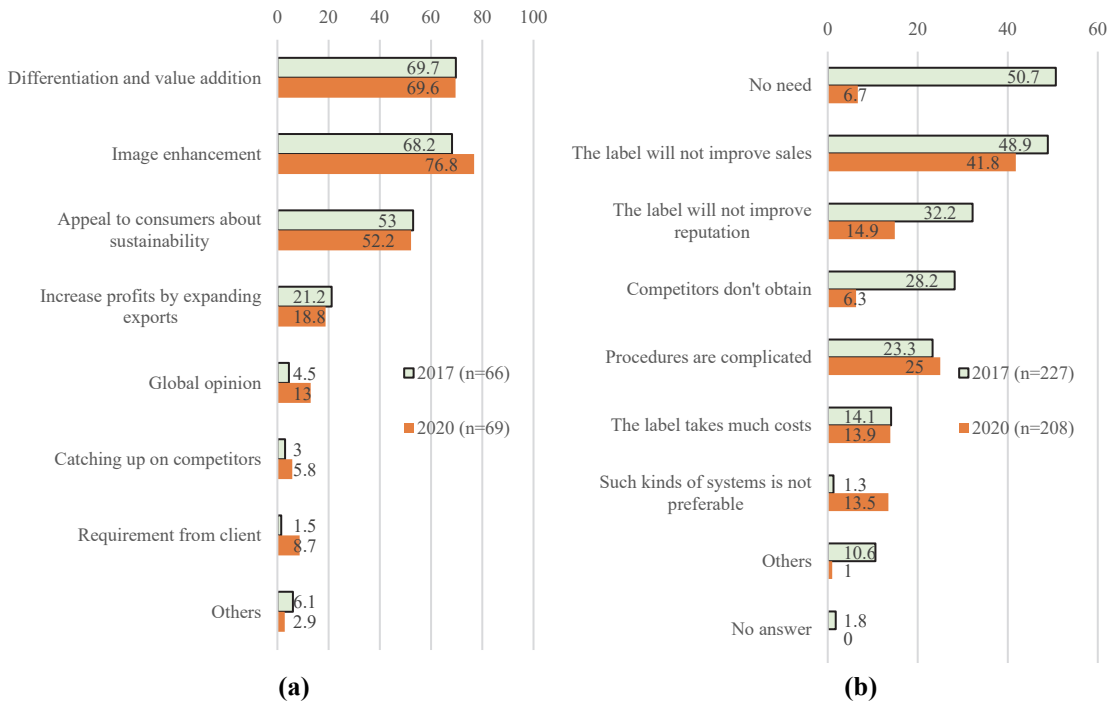


Figure 3.5. Results of surveys administered by MAFF regarding fishery certification (based on MAFF surveys, drawn by the authors): (a) reasons for wanting to obtain fisheries' certification; (b) reasons for not wanting to obtain fisheries' certification (%). Multiple answers.

3.5.2 Distributor attitudes and Trends

3.5.2.1 Respondents and their industries

Of the 322 CoC holders since 2016, 98 provided valid responses (30.7% response rate). Of these, 76% were dedicated to seafood supply, 41% were seafood manufacturers, 35% were seafood wholesalers, and the rest were restaurants (13%) and general trading companies (4%) (Figure 3.6).

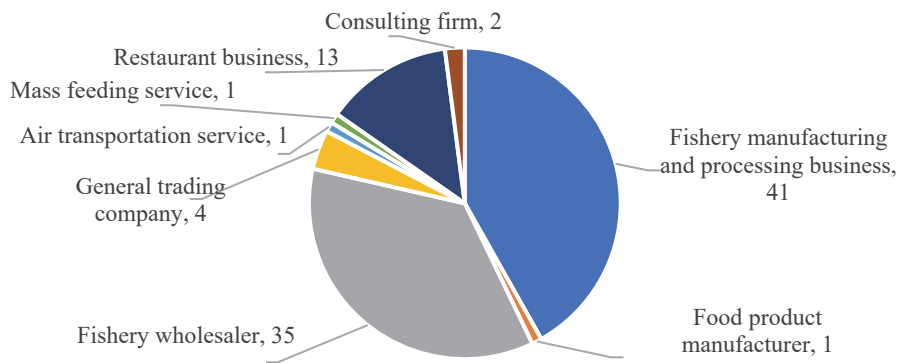


Figure 3.6. Industries of respondents with CoC (single answer, n = 98).

3.5.2.2 Motivations for, and difficulties in, obtaining certification, and impact of social conditions

Approx. 70% responded that they obtained CoC because of a request from their business partners, and approx. 50% wanted to contribute to seafood sustainability. Approx. 44% expected to expand their market, approx. 38% expected to improve their company image, and 33% wanted to make a favorable impression on consumers.

The most common difficulties encountered in obtaining certification were improving the internal system before the audit (approx. 40%) and the complexity of the procedures (approx. 40%), followed by internal consensus building (25%), with a tendency to opt for work within the organization rather than external matters.

In terms of the impact of social conditions, approx. 72% disagreed that they had much impact: approx. 49% strongly disagreed with Tokyo 2020 being a trigger for certification and approx. 12% agreed that Tokyo 2020 did not have much of an impact on promoting sustainable seafood certification. Conversely, almost the same number of organizations said that the social impact of the SDGs either had or had not triggered their activities (approx. 30% each; Figure 3.7).

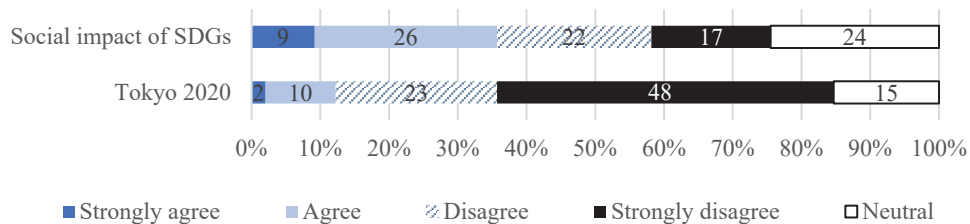


Figure 3.7. Triggers for obtaining CoC (single answer, n = 98).

3.5.2.3 Actual sales of sustainable seafood

Regarding the sales of certified products (Figure 3.8a), approx. 50% of the companies were selling from one to five certified products. However, more than 40% of the operators did not always sell these products, indicating that certified product distribution was inactive. The purchase prices of the certified products were higher than those of similar products without certification in approx. 50% of the businesses (Figure 3.8b). However, approx. 70% of the distributors did not raise the sales price, suggesting that the cost burden for distribution and sales was added to the certification cost.

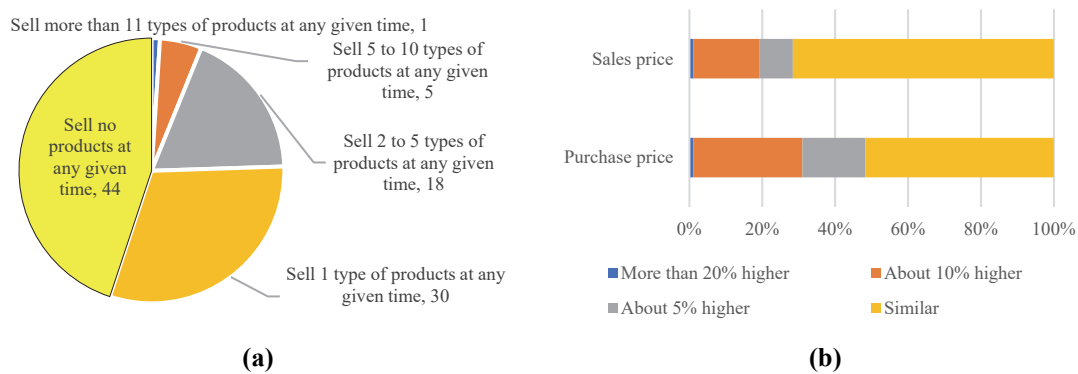


Figure 3.8. Actual sales of sustainable seafood: (a) number of certified products; (b) sales and purchase price of certified products (%), single answer, n = 98).

3.5.2.4. Effects of certification, communication, and future challenges

CoC certification holders found that consumers' response to certification was weak. Approx. 60% were uncertain (no response or other) about the consumers' response, approx. 20% experienced a reaction, and 20% experienced no reaction. Approx. 40% observed a difference in the reaction compared to their business partners (Figure 3.9a).

This dissertation categorized distributors into two groups in this survey, depending on their distance from consumers: the manufacturing and processing industry and food manufacturers and wholesalers were classified as upstream, and the rest as downstream. As shown in Figure 3.9b, downstream operators, who were closer to consumers, were more responsive, indicating that they experienced a certain level of impact. A Welch t test showed a significant difference between two groups ($t(32) = 2.27, p = 0.029$). However, nearly 70% of them observed no response, suggesting that the suppliers did not sufficiently communicate with consumers and that consumer knowledge of certification has not progressed.

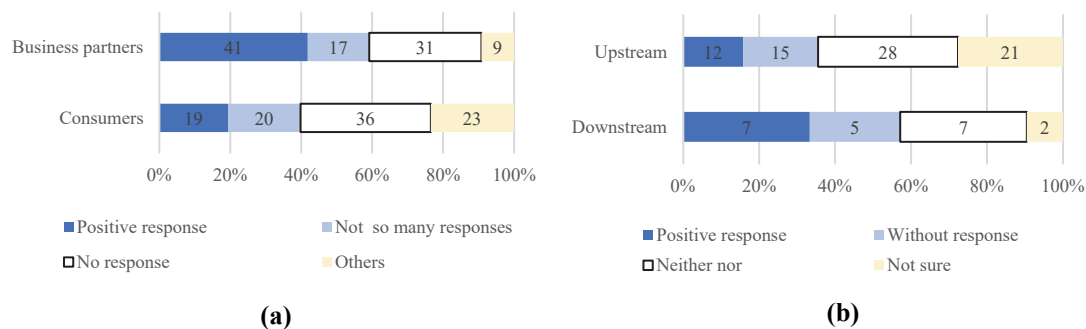


Figure 3.9. The response from business partners and consumers: (a) total average (single answer, n = 98); (b) difference in the distance from the consumers (single answer).

Regarding consumer expectations, more than 70% of the distributors chose to raise awareness of sustainability and MSC or ASC certification. Preferential purchasing was the answer for just under 50% of respondents, price premium the answer of approximately 30%, and looking for and buying products with the certification mark for only 10%, suggesting that the distributors understand that the awareness of the Japanese market needs to be raised before proactive purchase behavior occurs.

Nearly 50% of the distributors did nothing to communicate with consumers (Table 3.2). Even among those who did, 60% used only one method, such as displaying information on their websites, revealing that, while they hope to raise awareness and recognition, they are not actively engaging in outreach work. In addition, 70% of distributors did nothing to promote their products other than through their websites (Table 3.3). However, some operators actively took initiatives, such as developing original menus and providing education.

Table 3.2. Communication with consumers on sustainable seafood (n = 98).

Communication	Number of respondents	Percentage for all respondents	Percentage for Respondents with communication
Communication	46	47%	
No communication	52	53%	
Only one method	31	32%	60%
Only Internet	31	32%	60%
Only on-site	13	13%	25%
Combination of Internet and on-site	8	8%	15%

Table 3.3. Promotion of their sustainable seafood products.

Promotions made	Number of respondents	%
Nothing in particular	70	71%
Sale of original products and menus	15	15%
Educational activities inside and outside store	13	13%
Sales fair with expanded sales floor	8	8%

Analyzing the relationship between transmission to consumers and response (Figure 3.10), the operators who transmitted information to consumers were three times more likely to experience a response than those who did not. In particular, the response received by businesses that transmitted messages through the Internet as well as in the field was more than 40%, compared with approximately 10% of those that did not transmit information. This finding indicated that efforts to transmit information led to a real sense of effectiveness.

Considering the relationship between other approaches to consumers and responses (Figure 3.11), the response of distributors that directly communicated with consumers, such as by providing education inside and outside the shop, was greater, at over 40%. Conversely, of the eight businesses that held sales fairs with an extended sales area, one company found responses, while two did not.

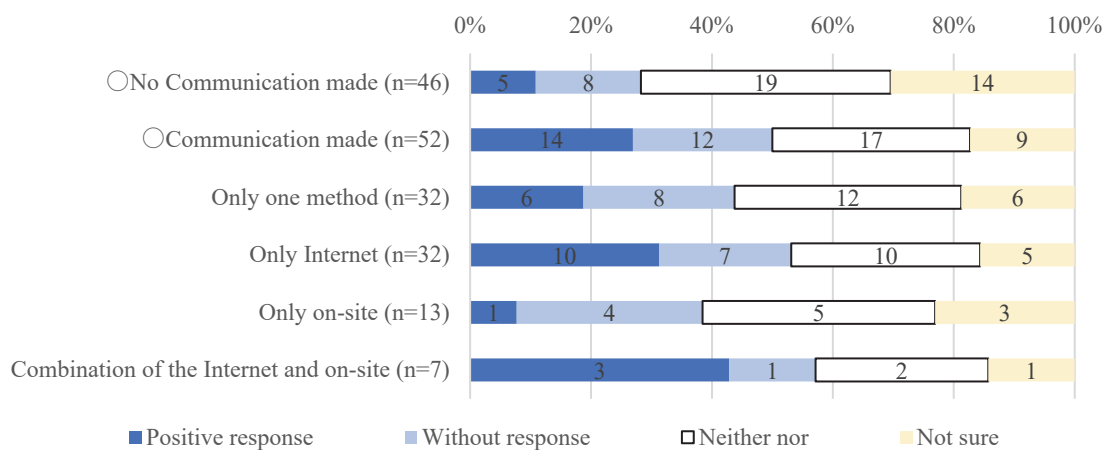


Figure 3.10. Relationship between information transmission to consumers and response.

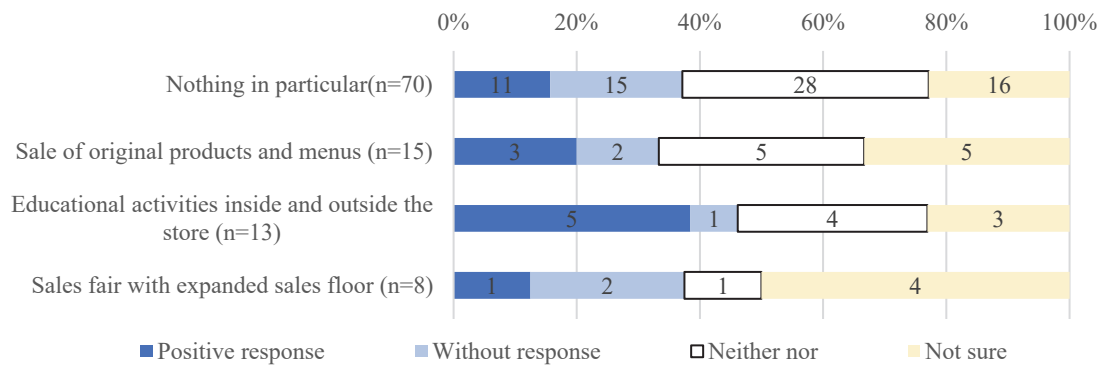


Figure 3.11. Relationship between other approaches to consumers and response.

When asked whether consumers generally feel that their awareness of sustainability and environmental considerations is increasing, overall opinions were divided into just two groups (Figure 3.12). Approximately 70% of downstream distributors felt that their awareness was improving, which was remarkably different from the response of those upstream. A Welch t test showed a significant difference between two groups ($t(35) = 2.19, p = 0.034$).

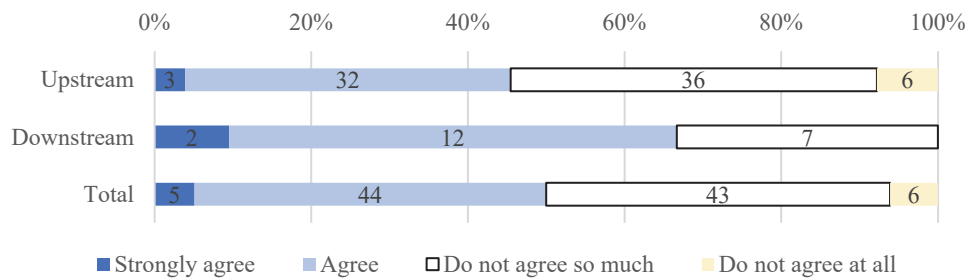


Figure 3.12. Consumer awareness of sustainability and environmental considerations is increasing (single answer).

The survey asked about requests to the government (Figure 3.13). To lead a campaign was the most common request, followed by subsidies, with both being made by approximately 50% of distributors. This shows that the distributors are expecting the government to lead and are willing to collaborate with political sectors. This survey also showed that cost-based challenges exist when distributing and selling certified products. Although fisheries can receive substantial subsidies [47], public funds for distributors are limited. Although some distributors were working on communicating with consumers, the response had not been sufficient, and so a demand for the government to build momentum was noted.

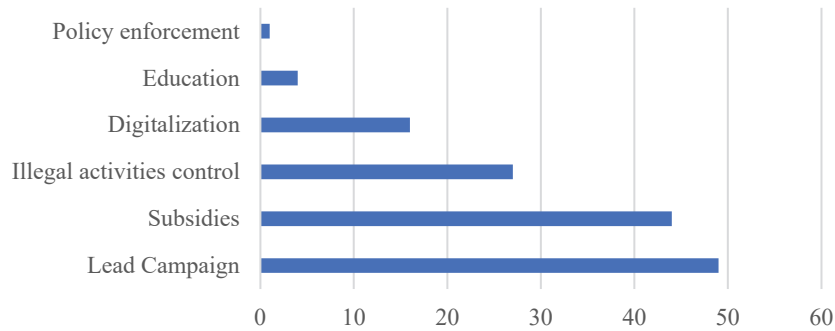


Figure 3.13. Request for the government from the distributors (multiple answers, n = 98).

The questionnaire lastly asked respondents to freely answer regarding what is needed to encourage consumers to choose sustainable seafood (Figure 3.14). A total of 68 out of 98 answered (69%). Education was the top demand, followed by increased awareness and media strategies; all these responses are related to raising awareness. Secondly, price adjustments and raising consumer income were mentioned, which shows that price is the second most important issue. Resource management, collaboration with the government, and the provision of subsidies and incentives are requests for government collaboration. Both Figures 3.13 and 3.14 show that collaboration with the government is wanted by the supply chain stakeholders.

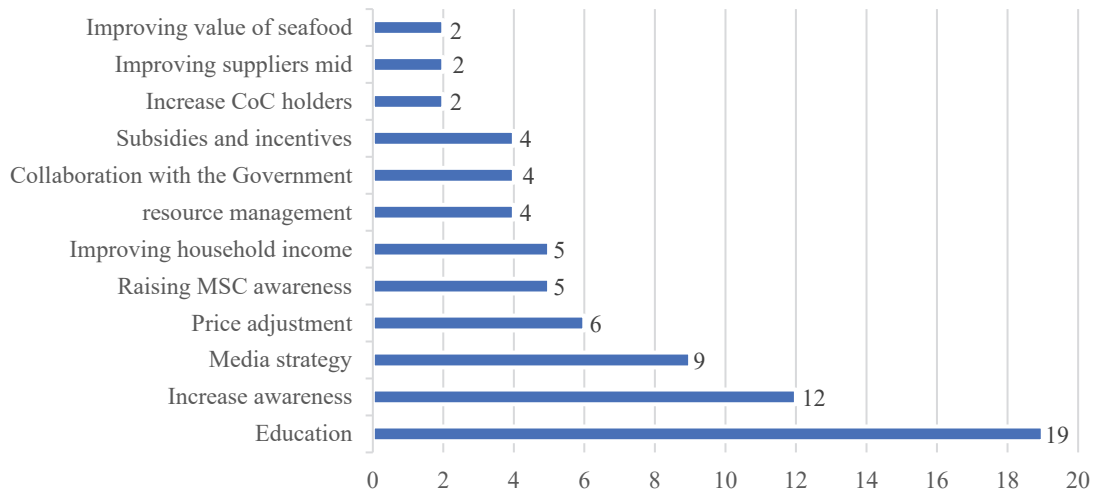


Figure 3.14. Need to encourage consumers to make sustainable seafood choices (free style, multiple answers, n = 98).

3.6 Discussions

3.6.1 Further adopting sustainability in the supply chain in Japan

The survey findings support this dissertation's hypothesis, as differences were found in the

level of awareness of proactive producers and distributors. A lack of consistent, mutual distribution of sustainability information was also found among these stakeholders. Then this dissertation found the factors that influence these differences and inconsistencies.

Firstly, MSC-certified fisheries are proactively working toward sustainability. They are aware of the need to increase sustainability and expand sales channels. They are highly motivated, and have overcome various obstacles, such as high costs, complicated procedures, and language barriers, to obtain fishery certification. These obstacles are the hurdles facing the fisheries: only 12 fisheries have been certified as of 2022, and increasing the number of certified fishers is a challenge. Approximately 3000 small-scale regional fisheries account for a large proportion of Japanese fisheries [48], and they may regard the obstacles as too great. However, MSC has recently encouraged multiple fisheries in the same waters to jointly apply, sharing the costs and obtaining certification as a group. The Kochi and Miyazaki Preparatory Council for International Certification of Pelagic Single Fishing Fishery for Albacore and Skipjack Fishing, which is an aggregate of two fishing cooperatives in two prefectures with 18 fishing vessels for albacore and skipjack, is a successful example of this in Japan [49]. As such, the ingenuity and efforts of the fisheries and certificate scheme owners should help to ensure that certification is attainable in a more realistic way, and is inclusive of small-scale fisheries.

Secondly, the survey found that the majority of CoC-certified distributors were passive in obtaining certification, doing so at the request of their business clients, and were generally inactive, being little involved in the dissemination of information or raising consumer awareness. This finding indicated that the CoC certification is not being fully used, despite the additional cost, and that cost is not being recovered. The respondents noted no confrontation or pressure from opposing forces, such as particular environmental NGOs or fishery organizations, in obtaining the certification, unlike the case of fishery certification. Most organizations experienced no difficulties in obtaining certification, and fewer hurdles than were experienced for fisheries' certification. Challenging CoC certification costs several hundred thousand yen, and only about one month is needed for recognition, whereas fisheries pay approximately 10–30 million Japanese Yen for assessment and face a 2–3-year research period [50]. However, this survey found hurdles within the organization: internal consensus-building remained difficult.

The downstream stakeholders have direct access to consumers, and feel more strongly about raising consumer awareness, so they should interactively disseminate information between consumers and upstream stakeholders. Businesses that proactively reach out to consumers are more likely to be responsive to consumer needs, indicating the importance of sharing best

practices.

Thirdly, both producers and distributors were aware of the growing knowledge of SDGs among society and have high expectations for future consumer awareness of sustainable seafood, as well as for government campaigns and expanded education in general supporting the movement. As shown in Figures 3.1 and 3.7, stakeholders did not have much interest in participating in Tokyo 2020. Tokyo 2020 provided an excellent opportunity to follow the success of the London Olympics in 2012 in terms of introducing sustainable seafood sourcing codes. However, several studies criticized the Tokyo 2020 sustainable sourcing code, which allowed for unsustainable seafood to be procured [51–54]. The quality of the sustainable sourcing code for future international events held in Japan, such as the Osaka-Kansai Expo 2025, should be improved to ensure that international standards are achieved to help raise the supply chain and consumer awareness.

Finally, one of the challenges is continuing the certifications. MSC and CoC certifications require renewal after five years for fisheries and three years for CoC. In certain cases, the continuation of certification may be abandoned if the motivation is passive or decreases, a revenue benefit is not realized, or the financial burden is too large. At that point, an incentive for continued application would be increased demand. Stimulating consumer demand and verifying its effectiveness are urgent issues.

3.6.2 Next steps for promoting sustainable seafood in Japan

Additionally, for how long should we rely on fishery certification? In the future, fishery certificates should not be the only solution to achieve a sustainable seafood supply. In the EU, a catch certification scheme was enacted in 2008 for all seafood products, enabling the traceability of all catches. In the USA, catch certification became compulsory for 13 major species in 2013, and a bill to make it applicable to all fish species has passed the House of Representatives. In Japan, the new anti-IUU law was implemented in December 2022 to mandate catch documentation. The first phase of the law applies to abalone, sea cucumber, and glass eel for Type 1 (domestic fisheries) and squid, saury, mackerel, and sardine for Type 2 (imported products); a review is said to be scheduled every two years to eventually cover all seafood products. It is vital that supply chain stakeholders will proactively implement this new rule and ask for a sooner application for more species, preferably all species. The operation of a catch certification system would eliminate IUU fishery-origin seafood from the market, provide traceability, and help to ensure a certain level of sustainability. The survey found a need to encourage supply chain

stakeholders to be proactive and adopt this new regulation.

A future challenge is to improve the official definition of sustainable seafood. Tokyo 2020 resulted in at least 95% of the seafood being supplied to the main dining hall being imported fishery-certificate-certified products, owing to the supplier's decision, but this means that the percentage of domestic products was less than 5% [55]. There was a dilemma: by placing the highest priority on certified products, domestic products were not adopted, and although the sustainability of marine products was ensured, the associated problem of carbon dioxide emissions due to long-distance transportation remained. As shown in Chapter 2, current fishery certification does not include food mileage, carbon footprint, or gender equality in its sustainability requirements. As time progresses, the composite elements of the SDGs conditions will need to be achieved. To resolve these issues, as this survey suggests, the stakeholders must collaborate with the government to support supply chain stakeholders' efforts and implement transformative ocean science.

3.7 Conclusions

The challenge in Japan is increasing the sustainability of most seafood-supply stakeholders, particularly small-scale fishermen, who make up the majority of the fishing industry. The surveys revealed that this issue could benefit from increased awareness and the sustainable distribution of the supply chain that distributes the catch. What if the distributors become more well-educated, well-informed and well-motivated, proactively select sustainable seafood, and start to identify the sustainability of small-scale fishers to support local businesses? What if those suppliers could function as judges of sustainability and sell sustainable products, providing fuller information to the consumers? This survey sampled proactive, eligible stakeholders, and the next step is to focus on the majority of stakeholders, who are not certification holders and consumers.

The limitation of this survey is that the stakeholders who are non-proactive in sustainable seafood consumption do not even answer the survey. For this study, 100% of MSC certified fishers responded to the survey, but the answers from the CoC-certified stakeholders were 30.4%. The even lower rate of the answers to the questionnaires from the majority of non-certified stakeholders is predictable, and it may not be easy to survey the status of sustainability-averse stakeholders. The possible extension is once the stakeholders realize that protecting the ocean protects their income and future. It is also important to obtain primary data on consumer awareness and behavior.

Achieving a sustainable blue economy in Japan and many other Asia-Pacific countries is crucial to achieving sustainability in the seafood supply chain globally. In addition to SDG14 (“Life below water”) for sustainable fisheries, synergy effects of multiple SDGs for sustainable production and consumption patterns must be ensured, as pursued in SDG12 (“Responsible consumption and production”), SDG13 (“Climate action”) and SDG5 (“Gender equality”). The United Nations has declared this the Decade of Ocean Science, setting this goal for 2030. This era provides a profound opportunity to achieve a nexus of science with policy, business, and consumption. The successful implementation of transformative ocean science in society is, therefore, expected.

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Chapter 4

Mapping of Stakeholders in the Sustainable Seafood Movement and Social Implementation of The Blue Seafood Guide

4.1 Objectives

4.1.1 Background

The principles and the methodologies of the sustainable seafood certificates and rating programs were discussed in Chapter 2. The characteristics, possibilities, and challenges of sustainable fisheries and seafood consumption in Japan were clarified through international comparisons. The challenges amongst the supply chain for sustainable seafood supply and consumption was analyzed in Chapter 3.

The study of BSG as an example of a sustainable seafood rating program in Japan is an indication of the sustainability of Japanese seafood. It is responsive to the current Japanese fish stock status, and the effect on the environment and fisheries' management conditions based on scientific evidence. There are a few groups of fishers and actors in the supply-chain that have obtained the MSC and CoC certifications and were motivated to work toward sustainability as current best practices in Japan. However, they were not making the most of the certificates they had obtained. The importance of implementing transformative ocean science to society and the collaboration of stakeholders is clearly demonstrated. One can argue that the next step to further improve the sustainability of Japanese seafood is to increase the awareness of the importance of seafood sustainability across all the stakeholders in a broader context and influence each stakeholder's decision-making at all levels.

4.1.2 Literature review

Stakeholder mapping (SM) or analysis (SA) is a methodology for identifying key stakeholders within a system and for assessing the potential impact of introducing changes in the system on the identified stakeholders (Grimble, 1998, p. 1) [1]. Stakeholders in SM or SA are usually identified and categorized empirically [2]. And in the case of seafood sustainability regarding

Fisheries Improvement Program (FIP), it is often used as part of the FIP scoping process to identify most relevant parties to the FIP and determine who needs to become a participant [3,4].

The design and implementation of voluntary environmental standards requires collaboration among multiple, divergent actors [5]. Weible et al. [6] raised the questions: “How do people mobilize, maintain, and act in advocacy coalitions? To what extent do people learn, especially from allies and from opponents? What is the role of scientists and scientific and technical information in policymaking? What factors influence minor and major policy change?” Unfortunately, there is no such former study to map the stakeholders for sustainable seafood consumption in Japan.

4.1.3 Objectives

It is empirically understood that the social change toward seafood sustainability should be achieved through the synergistic effects of legal and administrative reforms, their acceptance and implementation, changes in business practices, and changes in purchasing attitudes, all of which will be carried out simultaneously and without missing a single element. Given that is the case, one can claim that it would be possible to analyze each stakeholder's roles, challenges, possibilities, and relationships and gain a concrete perspective on resolving the challenges.

People who seek to maintain their own interests in the transformation of the social structure may be reform averse; this hinders and delays the implementation of sustainable seafood consumption. Information generated by transformative science is important to raise awareness of each stakeholder, and to form a sustainable society that will benefit society and the individual from a long-term perspective.

4.1.4 Purpose of this chapter

This chapter mapped the stakeholders across the society for the sustainable seafood movement in Japan. It discussed actual examples of the implementation of transformative ocean science in each category. It is crucial that stakeholder efforts are properly directed toward sustainability. This chapter delineates by broadly mapping the stakeholders for seafood sustainability across society and examines how each group can collaborate with the BSG to implement transformative ocean science to society.

4.2 Method of mapping the stakeholders

What factors influence policy change and raise public awareness? This study is based on stakeholder mapping and the literature review, including the advocacy coalition framework by Paul Sabatier. In addition to the author's knowledge from over 10 years of experience as the Chair and CEO of the international NGO for ocean conservation, the study has also benefited from the professional advice of several professors, including a professor of international politics and a president of a fund, a professor of education and former Vice Minister of the Education, and a professor of fisheries science and former administrator of the fisheries agency; they are academically successful and directly contribute to social change by implementing academic findings in society.

Sabatier explained about the advocacy coalition framework that the most useful aggregate unit of analysis for understanding policy change in modern industrial societies is not any specific governmental institution but rather a policy subsystem, i.e., those actors from a variety of public and private organizations who are actively concerned with a policy problem or issue such as air pollution control, mental health, or surface transportation [7,8]. The depletion of fish stock is the issue concerned in this dissertation.

Later in 2011, Sabatier et al. [6] identified six categories of Coalition resources: 1) Formal legal authority to make policy decisions, 2) Public opinion, 3) Information, 4) Mobilizable troops, 5) Financial resources, and 6) Skillful leadership. Each category describes the advocacy targets and advocates as follows:

1. Formal legal authority: government and central administration, and local government.
2. Public opinion: private sectors and consumers.
3. Information: scientists and academia.
4. Mobilizable troops: links between universities, student organizations, and public media which enabled a diffusion of the demands across the country [9].
5. Financial resources: foundations, donors, partners, and sponsors.
6. Skillful leadership: international organizations, NGOs, and advocates.

Webster [10] categorized the stakeholders of the fisheries: "Consumers and conservationists, commercial and recreational fishermen, politicians, diplomats, and bureaucrats—all these groups value highly migratory species for different reasons and therefore have diverse (often divergent) perspectives on fisheries management. A closer look reveals divisions within and overlaps among these clusters."

In this chapter, the stakeholders of sustainable fisheries and seafood consumption are classified based on categorization by the Sabatier model shown above, and are stated more in detail subsequently, based on the suggestion of Webster [10], to describe each groups' characteristics:

- 1-1) Formal legal authority: government/politician (a)
- 1-2) Formal legal authority: central administration /fisheries agency (b)
- 1-3) Formal legal authority: local governments (c)
- 2-1) Public opinion: private sectors: industry associations (d)
- 2-2) Public opinion: private sectors: fishers (e)
- 2-3) Public opinion: private sectors: business sectors in seafood supply (f)
- 2-4) Public opinion: private sectors: business other than the fisheries industry (g)
- 2-5) Public opinion: consumers (h)
- 3) Information: scientists and academia (i)
- 4) Mobilize troops: media (j)
- 5) Financial resources: foundations, donors, sponsors, and partners (k)
- 6-1) Skillful leadership: international organizations (l),
- 6-2) Skillful leadership: NGOs and advocates (m)

This study illustrates the above stakeholders of the sustainable seafood consumption on stakeholder mapping by centering NGOs, wherein the BSG was created to understand the factors that may influence public awareness increase in Japan (Figure 4.1).

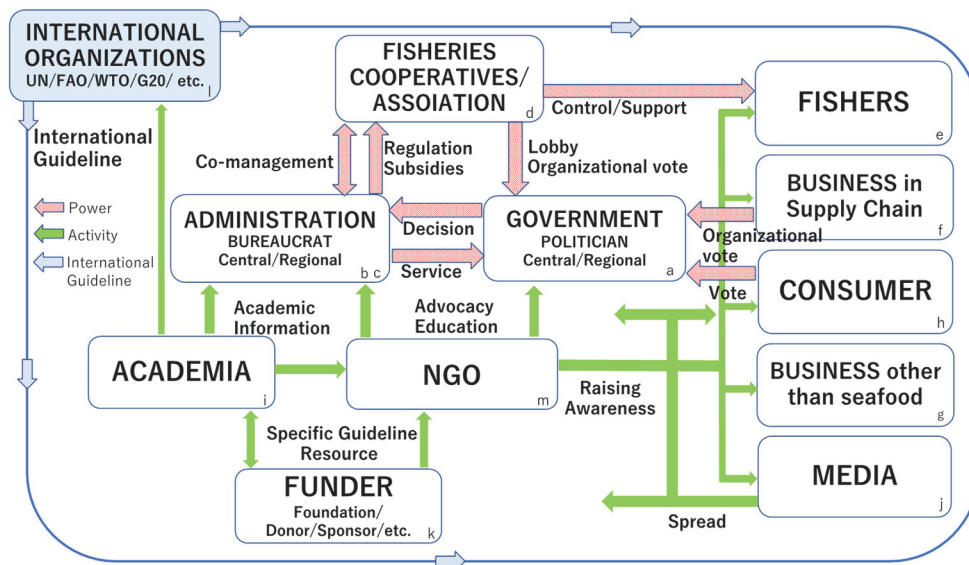


Figure 4.1. Stakeholder mapping for sustainable seafood movement with the BSG in Japan, centering on NGO.

The above mapping shows that international organizations such as the UN and its FAO provide a code of conduct for sustainable fisheries and other common international guidelines for seafood and fishery sustainability [11]. The decision makers, including the government, follow this code of conduct to transform the social attitude as the duty of members of the signatory country of the UN. In theory, administrations implement the decisions that are formulated by the government. Alongside the principles that the international common guidelines show, private funders provide specific guidelines that explain their strategies to be followed by their grant recipients such as NGO—for the cause—and academia—for the research—as the condition of the funding. The NGOs set up their own goals and strategies to educate and advocate toward politicians and bureaucrats and other stakeholders including fishers, business in the supply chain, business other than the seafood industry, consumers, and media. Academia transfer their knowledge and scientific evidence to society, mainly through international organizations, bureaucrats, NGOs, and funders.

Fisheries cooperatives and associations are the special interest groups that have close relationships with politicians and bureaucrats. They lobby politicians and offer them the organizational votes; furthermore, they govern and support fishers as they co-manage fisheries with bureaucrats who implement fisheries policy including regulations and provision of subsidies. Several rural local constituencies, which are most likely the Liberal Democratic Party (LDP, the governing party of Japan), are influenced by local fisheries cooperatives.

Both businesses and consumers are on the supply chain in different capacities, as explained in Chapter 3. And, as voters, they choose the politicians as their representatives.

Media relies on the information generated by stakeholders, including academia, business, and the government and administration, which then publicly provides the information based on its own interpretation. They obtain and collect experts' advocacy information from NGOs and interviews with various stakeholders, and then provide tailored information to the public.

4.3 Discussions: Description of each stakeholder group and implementation of transformative ocean science

This section describes the characteristics of each group of stakeholders on the stakeholder map through the implementation of transformative ocean science via analysis of the challenges faced by each group as they shift to sustainable fishery and seafood consumption.

4.3.1 Government and Fisheries agency

In Japan, elected officials operate under the parliamentary democratic system, wherein the bureaucracy plays the leading role in policy making: "politicians reign and bureaucrats' rule in Japan," according to Johnson [12]. The term to serve as members of the House of Representatives is 4 years, yet the duration of their service shortens when the dissolution general election takes place. The average length of service for the Prime Ministers between 1945–2012 (after World War II and before the Abe Administration) was 1 year and 11 months, and 2 years and 1 month including the Abe Administration (1945–2020) [13]. It seems challenging to carry out major political reforms or policies that require long time implementation during this short-term appointment. Consequently, lifetime employed officials with high educational background occupy strong positions to carry out their duties, and take over the actual work of policymaking, rather than the politicians who make decisions and give orders to the officials.

4.3.1.1 Government/politician (a)

The late Shinzo Abe's administration was the exception. It was the longest in history, lasted 7 years and 8 months. During the long-term government, Abe empowered the framework of the Regulatory Reform Promotion Council (RRPC) and established the style, "Prime Minister leads and the Ministries follow." This long-lived administration made the Prime Minister and key politicians more powerful. Consequently, the influence of the LDP became powerful over the Ministries. The strong leadership of the Prime Minister's office changed the fundamental power structure of the political stakeholders. Drastically reformed fishery law was delivered in December 2018, for the first time in 70 years.

Politicians usually work for the claims from their constituencies, and the so-called fisheries tribe members work for their voters' advantages. Meanwhile, some energetic lawmakers are striving to revitalize the fishing industry through drastic fishery reforms. The RRPC is under the direct jurisdiction of the Cabinet Office and has suppressed some opponent powers.

The diet members started to become aware of the role of the BSG; 9 out of 713 diet members, including a Vice Minister, 3 former Ministers, and 2 former Vice Ministers, attended the BSG annual charity gala in 2022, where each of them introduced their commitments for sustainable seafood consumption.

4.3.1.2 Central Administration/Fisheries Agency (b)

The FAJ has jurisdiction over fishery resources in Japan. There are certain hierarchies and territories between ministries, and the Ministry of the Environment (MOEJ) cannot step into the sustainable use of fisheries resources, despite the issue being environmental; this is because MOEJ jurisdictions cover the river to brackish water, but not the ocean. For example, the MOEJ publishes a Red List with endangered species in Japan in these regions, but excludes marine species living beyond brackish water, such as bluefin tuna. The FAJ separately published its Red List called "The data book for Japan's rare wild species in the water" in 1998; it has not been updated since 2000 and the relevant information is unavailable online. The MOEJ added 56 endangered marine species in 2017 after Japan committed to include marine species to the Red List at Convention on Biological Diversity 2010 (COP10). However, this new list excluded species involving international or binational agreements that evaluate stock status, species which are evaluated for the stock status by the FAJ (67 species in 2019), and the whale family. This rule enabled the exclusion of popular seafood from the Japanese Red Lists that are actually endangered species according to the International Union for Conservation of Nature (IUCN), including Pacific bluefin tuna and sharks.

The FAJ is a division of the Ministry of Agriculture, Forestry, and Fisheries. Its annual budget in 2021 was twice as much from the previous fiscal year due to the revised Fisheries law. However, this is approximately 13% of the overall budget of the Ministry of Agriculture, Forestry, and Fisheries (2.3 trillion yen). The national budget is 300 trillion yen, consisting of 5.3 trillion yen for defense, and 5.5 trillion yen for education and science expenses.

Makino [14] stated "co-management" as Japan's traditional fisheries governing style. It is said to be effective in respecting the small coastal fisheries management styles. The FAJ has collaborated to co-manage fisheries with Zengyoren, or Japan Fisheries Cooperatives (JF) and Dainihon Suisankai, or Japan Fisheries Association (JFA). The FAJ depends on the capacity of JF and JFA, owing to the lack of resources. This traditional administrative structure allows fisheries organizations to hold the power over legislation and implement the relevant laws and regulations.

There is "sectionalism" stemming from the jurisdiction of related ministries for sustainable seafood consumption and marine environment protection to create the barrier for comprehensive ocean governance. The EU government Director General of Marine (known as DG Mare) is in charge of general ocean issues. Meanwhile, the National Oceanic and Atmospheric Administration (NOAA) covers all aspects of oceans in the United States. The lack of unified

governance for the ocean in Japan may cause delays in decision making and application of the latest technology or the necessary coastal guard for fisheries. There is concern that the Japanese fishery reform act is behind the EU and the USA. This may affect the development of globally sustainable seafood collaborative actions, such as the elimination of IUU fisheries products from the global market by mandating catch documentation to all fisheries products to facilitate international trade.

4.3.1.3 Examples of a user-driven implementation of the BSG at the G20 and TICAD

Several governmental events used BSG as a sustainable sourcing code. The meeting of G20 Finance Ministers and Central Bank Governors in Fukuoka was held in 2019. The chef Yoshitake, who was appointed to be in charge of the food for the meeting delegation, asked BSG for the consultation for serving sustainable seafood. The BSG team evaluated the local species that was chosen by the chef. The posters and leaflets of the BSG were displayed in the dining room, which gathered the attention of participants.

The seventh Tokyo International Conference on African Development (TICAD) was held in Yokohama in 2019. The official venue was Pacifico Yokohama and the main hotel accommodation was Intercontinental Yokohama Grand. Both venues are BSG partners; thus, they served sustainable seafood chosen from the BSG.

4.3.2 Local governments (c)

In Japan, compared to the central government, the heads of local governments have higher authority and a capacity for a top-down implementation style primarily derived from the election system. Local government leaders are directly elected, unlike the Prime Minister and Ministers. This election system facilitates the formation of a local government that best reflects the people's will, and under the eligible Governor, faster reforms become possible. For example, Mie prefecture hosted the G7 in 2016 with the strong leadership of Governor Suzuki who made a comprehensive agreement with the BSG team in 2016 to create the first local version of BSG. The local government, local Fisheries Association and Mie University collaborated, and some local restaurants and shops partnered with the BSG.

First, the BSG team faced a lack of information. They found that the local stock assessments were not conducted on an MSY basis. Therefore, the BSG steering committee decided to establish a local rule for the prefectural versions and use the traditional stock assessment as the reference

value in the absence of MSY-based data. This decision increased the number of species that could be certified as a local version of Blue Seafood, and the BSG Mie was launched in 2020. It helps support local fisheries to make positive efforts towards sustainable fisheries as per the BSG concept and creates incentives for local governments and fishers to work together for well-managed fisheries for sustainable seafood and uses the BSG to promote their products (Figures 4.2 and 4.3).



Figure 4.2. Blue Seafood Guide Mie version.



Figure 4.3. Blue Seafood Guide Mie version.

The second production of the BSG local version was made with the Tokyo Metropolitan Government (TMG). Figure 4.4 shows the procedure of the BSG Tokyo creation. Governor Yuriko Koike, based on the BSG Mie, asked the BSG team to exchange the comprehensive agreement for the collaboration to realize sustainable fishery and seafood consumption in Tokyo, and create the BSG Tokyo version (BSG Tokyo).

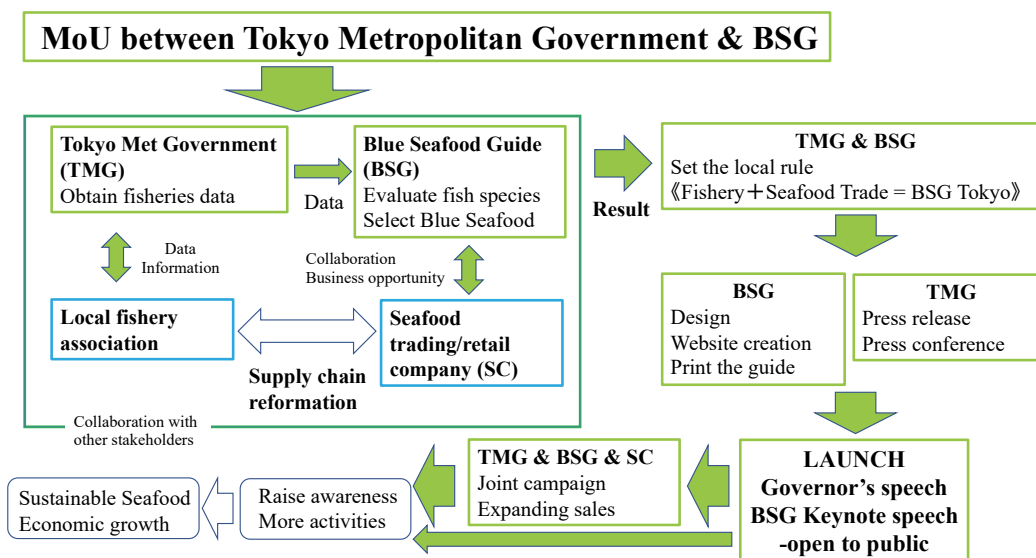


Figure 4.4. Procedure of introducing the BSG Tokyo version.

Evaluation of the fisheries products of Tokyo by the BSG science team determined that only six species are eligible as Blue Seafood in 2022. The BSG team and the TMG decided to introduce the species traded at Toyosu market as well on the BSG Tokyo as Tokyo is Japan's center of the seafood trade.

The study for creating BSG Tokyo found that some of the local fish were not ported in the Tokyo bay area. Instead, they were shipped over 500 km to the Tohoku area, frozen, and transported by truck back to Tokyo. The BSG team collaborated with Haneda-Ichiba, the supplier and one of the Blue Seafood partners, and developed the new supply route, to port the sward fish captured in Tokyo waters directly to the Tokyo bay—to facilitate fresh supply to the retailers. This has allowed Tokyo to enjoy fresh sward fish sashimi for the first time; furthermore, this transformation has aided in reduction of fuel usage and CO₂ emissions for fishing and transportation, offered the transparent traceability of the trade, and enabled the supply of fresh and branded product. This BSG collaborative project was announced by TMG, and the newspapers and TV programs including NHK news introduced the BSG and BSG Tokyo.



Figure 4.5. Examples of media coverage of BSG Tokyo.



Figure 4.6. Examples of media coverage of BSG Tokyo by NHK.



Figure 4.7. Examples of media coverage of BSG Tokyo.

The governor of Hiroshima and the Osaka Prefectural Government have requested for the MoU to create their prefectural version of BSG in 2023, which can be viewed as a positive effect of the transformation. Hiroshima will host G7 Hiroshima in 2023 and Osaka to host Expo in 2025, both

of which will be highlighted for international attention, with sustainability strategy and action witnessed by the world.

4.3.3 Industry associations (d)

There are two major fisheries organizations in Japan: the JFA and JF. The JFA was founded in 1882 with the aim of promoting the fisheries industry and encouraging its economic and cultural development. Its membership consists of over 500 representative organizations and companies involved in the fisheries industry in Japan [15]. Traditionally, they have strong connections with the FAJ as their Chairman was a former Director General of the FAJ or a former Under Secretary for the Ministry of Agriculture, Forestry, and Fisheries for at least the last six generations, and former FAJ staff have held senior positions such as Executive Director [16]. This strong personnel network built between FAJ and major fisheries business sectors has merits and demerits. A significant merit is the smooth operation of fisheries co-management, while a demerit is that the JFA may have stronger power over FAJ with the power of seniors.

Although JFA explains on their website that their main revenue is from the membership fee [15], and it is meant to be so, their actual total annual budget for the fiscal year 2021 is 716 million yen, of which, the main source of income is 383 million yen in subsidies, followed by 144 million yen in membership fee income and 74.5 million yen in investment income. That shows, over half of the budget depends on subsidies [17].

JF consists of 943 local coastal fisheries cooperatives, 653 inland fisheries cooperatives, and 659 other related cooperatives, as of March 1, 2019. There are approximately 300,000 fishers nation-wide and their finance background is Norinchukin bank, which aims to facilitate the financing of cooperative organizations of agriculture, forestry, and fisheries companies, with total assets of 105.5 trillion yen. Bloomberg reported Norinchukin bank as the second strongest bank in the world in 2015 and 2016. Makino [18] stated that Japan's fisheries are characterized by their small scale and diversity, and the fisheries co-management approach has a history of clarifying the rights and responsibilities of local fishermen to ensure effective management through cooperation between the government and fishermen. The FAJ's "Resource management plans" combines public management by the government and voluntary management by fishermen to enhance "fisheries co-management."

Makino et al. [19] also stated that, "top-down, command-and-control management measures by the central government are difficult and costly to implement. Consequently, a community-based fisheries co-management regime was developed in Japan. Under this regime, responsibility

and management are shared among resource users and the government. Therefore, it is difficult to introduce drastic management measures, even if most fishers recognize that a particular resource is declining."

The above discussions show the challenges in implementing the international or western model for sustainable fisheries management in Japan. However, coastal fishery—which is said to be Japan's unique fishery—is only 22% of the total fisheries by volume. The total production of fisheries in Japan was 4,173,000 tons in 2021, in which, the landings for coastal fisheries were 938,000 tons, 2,000,000 tons for offshore fisheries, and 254,000 tons for pelagic fisheries [20]. Eighty percent of fishers are dedicated to small-scale fisheries; however they only account for approximately 20% of the production. 78% of the fisheries production in Japan is by offshore, pelagic, or aquaculture fisheries which may be adoptable to the international standard of sustainable management. In fact, the new reformed fisheries law implemented in 2020 regulates offshore and pelagic fisheries with TAC and IQ to follow the sustainable management in the EU and the USA. This application of TAC and IQ for the majority of Japanese vessels may make a change to the managed fisheries in Japan.

One of the causes of overfishing is said provision of excessive subsidies, the elimination of which is explicitly stated in SDG 14. Pauly [21] stated that reducing fishing capacity to appropriate levels will require strong reductions of subsidies. The FAJ's total annual budget for the fiscal year 2023 is 321.3 billion yen, with 183.8 billion yen (57%) mainly devoted to developing fishing ports. In addition, 14 billion yen is allocated to subsidize the construction of fishing boats[22]. While the ratio of coastal fishermen to offshore/pelagic fishermen is approximately 80% to 20%, as mentioned above, subsidies of 4 billion yen and 10 billion yen—or 28.5% to 71.5%, wherein the ratio is reversed—are allocated to coastal and offshore/pelagic fishermen, respectively. The UN Oceans Conference and World Trade Organization (WTO) meetings [23] view overfishing in the pelagic fisheries as a problem and state that drastic reform of the subsidies structure is needed to protect small-scale regional fisheries.

4.3.4 Fishers (e) and businesses in the seafood industry (f)

This section categorizes fishers into 3 groups: 1) Progressive fishers and the business sector that understand the importance of sustainable fishing and are actively working to shift to science-based managed fisheries; 2) Reform-averse fishers and the business sector that attempt to fish and/or sell as much as they can within the framework of the old fisheries law for short-term gain; 3) Parties that fall in between groups 1 and 2.

4.3.4.1 Progressive fishers and businesses

Progressive fishers and businesses learn and hear about sustainable fisheries, work together with scientists and NGOs for experimental fisheries, and some challenges, to obtain sustainable fisheries certifications and CoC certifications.

The BSG supported Usufuku Honten, a Tohoku based bluefin tuna fishing company to obtain the world's first MSC recognition for Northeast Atlantic bluefin tuna in 2020 with their Dai-ichi Shofukumaru vessel. The approval process for this certification began in July 2018, and reached the final stage in early 2020 after a long process of onboard audit, interviews, expert report reviews, and public comments from stakeholders, with the support of NGOs and scientists. Toyo Reizo, a subsidiary company of Mitsubishi Corporation that trades bluefin tuna, supported UH financially. During the procedure for the recognition, UH faced few objections from the WWF and PEW Charitable Fund (PEW). They also received negative comments from reform-averse fishers and organizations that were unwilling to welcome the MSC during the application period. However, MSC certified UH in July 2020. UH is based in the Kesenuma village, Miyagi prefecture, where the great Tohoku earthquake and tsunami occurred in 2011. The village was completely destroyed, with a loss of approximately 1400 people out of the around 73,500 population [24]. UH spent almost 3 years and 30 million JPY and obtained the MSC certificate to be a symbol of sustainable recovery from the Tsunami.

There are a few progressive- and sustainable-minded fishery company owners from the younger generations. There is a group on SNS called “Fishers club to make Japan's fisheries industry the proud world's number one industry,” where more than 360 proactive fishers exchange their opinions online.

Further, the Uoko fishmonger group started to offer “Blue Seafood of the day” at “Blue Seafood Corner” in their shops, and they sell approximately seven Blue Seafood species every day.

The BSG has approximately 70 partners, including prestigious hotels and restaurants such as InterContinental Yokohama Grand and Miyako Hotels Group as well as major Japanese food service companies such as AIM Service, Sidax, and TFK. They provide Blue Seafood at the pace they can.

4.3.4.2 Reform-averse fishers and business

Reform-averse fishers are conservative and refuse change or challenge. They fear losing income while periodically reducing the catches for stock recovery to a sustainable level. Small-scale fishers tend to gain less compensation, so decreased income is a serious problem. In contrast,

some large-scale business in this category seek short-term profit for their annual corporate performance.

A failing example of BSG with reform-averse business in the case of seeking a partnership is as follows: in 2015, the executive director of a major food maker refused to be partnered with the BSG, as he wanted to avoid the decrease in profit of the subsidiary seafood trading company, which affects his promotion. He also explained that he does not care about the future of seafood sustainability in 10 years, even for his company, because he will be retired by then. This example shows the importance of basic education. However, the same company, headed by a different director, applied to become a BSG partner in 2022, which indicates that the movement has been initiated.

4.3.4.3 Fishers and businesses between groups 1 and 2

Fishers and businesses between groups 1 and 2 passively follow the instructions from the FAJ and JF, or doing nothing particular for sustainable seafood. As discussed in Chapter three, fishers and businesses in this category may become progressive to the sustainable fishery and seafood trade, depending on education and social demand for sustainable seafood.

4.3.5 Business other than the fisheries industry (g)

Businesses other than the fisheries industry have potential powers to drive the movement of sustainable seafood consumption and to raise awareness. For example, Maxcel is a large scale electric company that became a BSG partner, which promotes and serves Blue Seafood in the cafeteria (Figure 4.7). Yahoo is an information technology (IT) company that serves a Blue Seafood bowl at their cafeteria for their employees. Pasco is Japan's leading baking company; it sells 100,000 pieces of Blue Seafood Konbu seaweed bread per day with the BSG logo on the packages and contains a brief description of sustainable seafood (Figure 4.8). Kyoto University offers “Blue Seafood curry” in the cafeteria; it is produced by Dean Dr. Yamagiwa and has become a popular dish.

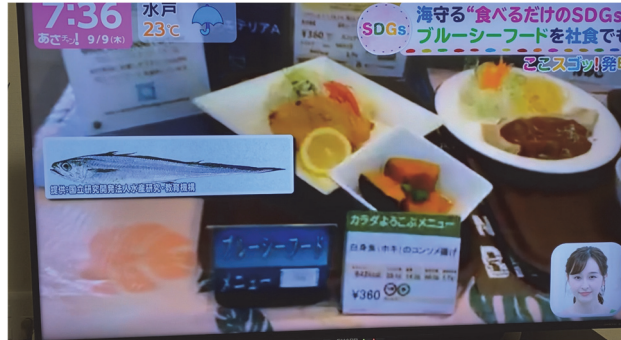


Figure 4.7. Blue Seafood promoted by Maxel at their cafeteria, broadcasted by Nippon TV



Figure 4.8. Blue Seafood promoted by Pasco

4.3.6 Consumers (h)

Consumers are located at the end of the supply chain and are the only group not generating a profit out of seafood. They are powerful as the decision makers for sale and the voters for political elections. The uniqueness of this group in the stakeholder mapping is that anybody can belong to this category and overlaps the group to belong; for example, fishers and politicians are also consumers as they buy fish. Recognition of sustainable seafood in Japan still needs to improve, as discussed in Chapters 2 and 3; therefore, it is crucial to raise general consumer awareness. Chapter 3 concluded that one way the stakeholders in the supply chain can contribute is to proactively supply information and educate consumers. BSG provides information to consumers on what to buy for sustainable seafood consumption so that the BSG contributes to consumer education. The dissemination of BSG and its use as a sustainability guideline during purchasing is one way to realize that sustainable seafood purchasing to become the norm.

4.3.7 Scientists and academia (i)

The UN introduced a statement to strengthen the science-policy nexus at the International Symposium on Fisheries Sustainability at FAO in Rome in November 2020 [25]. One of their key messages was: "There is a strong need to integrate fisheries into broader planning and governance frameworks that bring multiple sectors together and facilitate the implementation of evidence-based assessment and management" [25]. This term suggests respect for evidence-based management. Japan faces the challenge of implementing science-based policies. Many scientists work hard for it. However, some so-called "goyogakusha" (servant scientists) tend to wind the truth of science for someone's convenience.

Miyahara, the former chair of Japan Fisheries Research and Education Agency, and former Deputy Director of FAJ, answered the question "Why do so many scientists say fish stock is not decreasing?" on the New Year's special edition of the Nikkan Suisan Keizai newspaper in 2019 [26]: "They want to speak the truth and want to stop overfishing, but they are unable to do so. They pay the consideration of the FAJ, who are blamed by fisheries industry, and concede that the situation is ok as long as it does not get worse. There is no malice in that, but from now on, that is not good. With the new reform, scientists should be able to present their views clearly without considering what the bureaucrats or the fisheries industry think."

Figure 4.9 shows the example of the FAJ announced about the reason of fish stock depletion; The reason for the record low level of catches is the rising water temperature and foreign fishing vessels fishing (2019) [27], while overfishing and need for the sustainable fishery management are not mentioned (Figure 4.9). As FAJ indicates that establishing a data collection system is essential, scientific information and its correct use are expected.

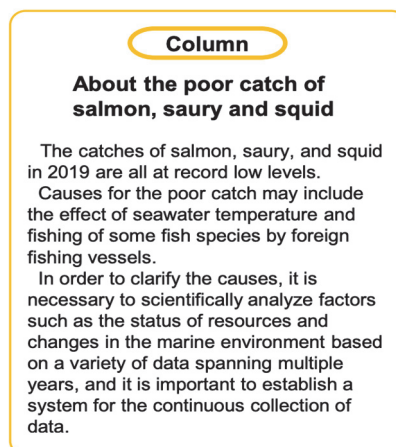


Figure 4.9. FAJ announced about the reason of fish stock depletion. [24]

A significant example of science being distorted was the Sustainable sourcing code for the Tokyo 2020 Olympic and Paralympic Games (Tokyo 2020). Tokyo 2020 adopted Shigen Kanri Keikaku, or resource management plans under the old fisheries law, as evidence of seafood sustainability. With it, Tokyo 2020 certified that about 90% of Japanese seafood products were considered sustainable. This code conflicted with the official FAJ report stating that only around 16% of the fish stock was at the sustainable level, and over 50% was at low levels (see Chapter1, Figure 1.2). The LDP investigated and concluded that approximately 80% of the resource management plans—among 1,449 plans in Japan—were inappropriate [28]. For example, if a fisher reported that they did not fish on Sundays, it was regarded as proof of managed and sustainable fishery. As a result, this resource management plan was replaced with a new “Resource management agreement” in 2020, but Tokyo2020 refused to eliminate it from the code. (see Chapter3, 6.1)

Further, MEL once certified some species whose stock status was low. Six fisheries were certified in December 2020; however, most stock status was below the Limit reference point for spawning stock biomass (B-limit). MEL was founded by JFA with the support of FAJ in 2007, and MEL Version 2 (MELV2) was recognized by GSSI in 2019 [29]. Its evaluation was operated by the Japan Fisheries Resource Conservation Association (JFRCA), which recognized stock status above the B-ban to be sustainable. However, below B-ban is as low as the thresholds for recommending a fishing ban or similar measures due to stock depletion.

JFRCA [30] revealed that their annual budget was about 223 million JPY, with one-third from FAJ subsidies and more than half from MEL and related clients; therefore, they tended to provide services favorable to their resource suppliers. (30 million by member fee from the members of JF and prefectures, 125 million from MEL and other clients, and 64 million from the government subsidies.) Three NGOs (SFSJ, WWF, and Seafood Legacy) sent a joint statement to MEL and GSSI for the adjustment, and MEL improved their evaluation by October 2022.

Shimamura [31] stated that the plentiful research funds and the decent position in the institution must be as attractive as addictive narcotics. Moreover, if a scientist becomes a committee member of a government council, that gives him/her good reputation. If they are not against the government and work with no serious error, they will receive position at some company or organization after retirement, and even the chance of the decoration is awaited. Also, Watanabe [32] stated that if research funds are provided by a ministry or organization that promotes a certain policy, rather than for basic research, it is easy to suspect that the funders were involved in setting

the preconditions, even if the scientists themselves are conducting the research in accordance with scientific methodology.

Science bodies should be structurally and financially independent and protect scientists from manipulation.

4.3.8 Media (j)

There are two types of media in the 21st century: old and new. Old media includes TV, radio, newspaper, magazine, posters, and signs. New media or social media includes various platforms such as websites, LINE, Twitter, Facebook, Instagram, YouTube, and TikTok.

Mass media is a one-way communication from the senders: sponsor/media to the receivers (listeners), while social media is interactive between individuals who can be either be senders or receivers [33].

The power of new media is emerging, and the consumers and general public are no longer the "silent majority" as they become the "tweeting majority" with the power to change politics and society. It also narrows the distance between the decision makers and the general public. For example, President Trump often announced official comments on Twitter and communicated with his followers. In Japan, Minister Taro Kono became popular among the young generation because of his friendly comments on his twitter where he has 2.7million followers. The new media also provides interactive relationships; people are able to virtually interact with each other online and create new communities according to their interests and necessities.

Old media still has a huge impact as it has a wide audience; moreover, major newspapers are considered trustworthy news sources. The circulation numbers of major newspapers in Japan are: Yomiuri, 7,700,000; Asahi, 5,160,000; Mainichi, 2,250,000; and Nikkei, 2,130,000 [34]. Newspapers are read by approximately 14.3% of the population. Meanwhile, there is a much larger number of SNS followers: the overall number of active users in Japan is estimated at 82,410,000, which is approximately 68.6% of the entire population. A survey showed the utilization ratio of the popular SNS tools in Japan: LINE, 77.4%; Twitter, 38.5%; Instagram, 35.7%; YouTube, 23.2%; Facebook, 21.7%; and TikTok, 8.1% [35].

Old media is dictated by sponsors, whereas new media is free from sponsorship. Social media are mostly free to use; therefore, it is a suitable tool to promote and raise awareness among the public, even with a limited budget. Old media has a certain trust-based value; thus, the content shared by old media is a proof of the quality of news, which further helps to raise awareness. Press conferences and press releases are effective ways to approach old media. The nexus of old

and new media is in progress; most of old media have online services such as NHK on-demand, Nikkei online and Yomiuri online.

As discussed in Chapter two, the BSG was introduced by major newspapers, TV news, and programs. They have their own social media together with official columns in major online magazines such as Forbes Japan and the fashion magazine, 25ans. The increase in the number of times the BSG is reported in the media is proportional to the increase in the number of firms applying for the partnership (Table 1). Some of them mentioned that they applied for the partnership because they saw the TV program. This fact suggests that the media contributes effectively to the implementation of the transformative ocean science to the society.

Table1. The number of media coverage of the BSG and the number of partner applications from 2017 to 2022.

Year	Mazagine/Book	Newspaper	TV	Online magazine	Sum/Public media	Sum/Own online media	Partner application	Remarks
2017	0	0	2	1	3	3	5	
2018	1	0	0	1	2	6	4	
2019	0	2	1	2	5	4	3	
2020	3	10	0	9	22	14	5	Covid
2021	5	6	2	15	28	6	14	
2022	3	9	4	6	22	6	14	

4.3.9 Foundations, donors, sponsors, and partners (k)

The culture of charity and the power of funders (foundations, donors, sponsors, and partners) in Japan is limited compared to the EU and the USA. In Japan, there are approximately 771 foundations, among which, the Nippon Foundation is the largest. Their fund is based on subsidies originating from the profit of motorboat racing, and their annual budget can exceed 300 billion JPY, while the remaining top 10 foundations' annual budget is between 10–50 billion JPY [36]. However, Nippon Foundation's budget looks small compared to the budget of the world's top 10 foundations (Figures 4.10 and 4.11).

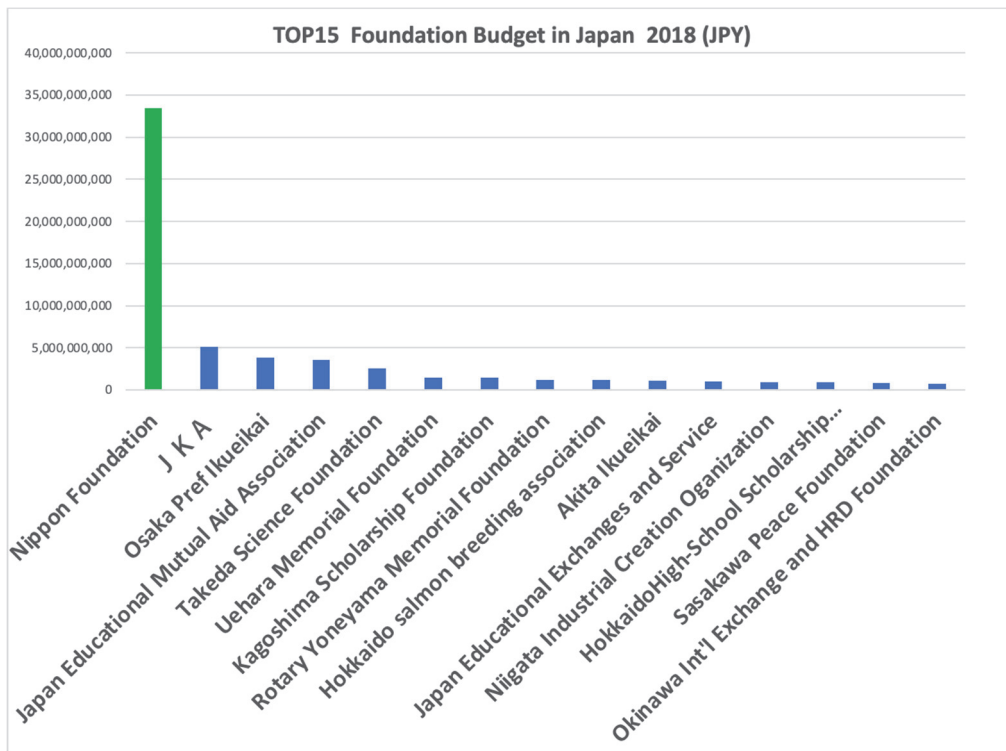


Figure 4.10. Top 15 Foundation's budget in Japan 2018 (Made by the author from the chart of Japan Foundation Center [36])

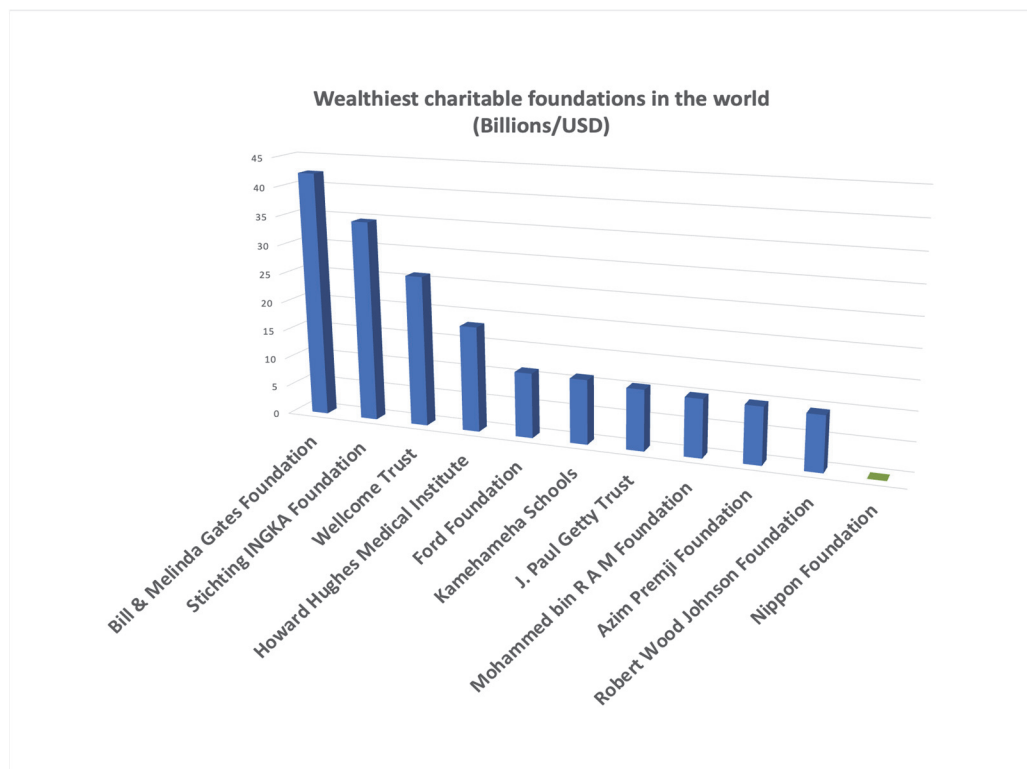


Figure 4.11. Top 10 wealthiest charitable foundations in the world and Nippon foundation (Made by the author from the chart of World Atlas 2022 [37])

The tax system in Japan doesn't encourage individuals to form large foundations to generate grants for specific causes. Additionally, the funders are not matured compared to funders in the US. Some funders even operate their own projects and compete with the NGOs.

Amongst four US funders and one Japanese funder who funded the BSG, only the Japanese funder restricted the recipients from mentioning politically sensitive topics such as endangered bluefin tuna fishing, whaling, and building high seawalls. It may have happened to avoid trouble with the Japanese government, which has specific control over this funding. In that case, the fund receiver cannot be independent and non-governmental and lose the freedom of speech. The maturity of Japanese NGOs and Academia may depend on the maturity of domestic funders.

4.3.10 International organizations, NGOs, or advocates (l), (m)

The FAO issued The Code of Conduct for Responsible Fisheries [9] as the concrete pillar for the global community. The introduction states that: "This Code sets out principles and international standards of behavior for responsible practices with a view to ensure the effective conservation, management, and development of living aquatic resources, with due respect for the ecosystem and biodiversity. The Code recognizes the nutritional, economic, social, environmental, and cultural importance of fisheries, and the interests of all those concerned with the fishery sector. The Code takes into account the biological characteristics of the resources and their environment and the interests of consumers and other users. States and all those involved in fisheries are encouraged to apply the Code and give effect to it."

The UN also provided Sustainable Development Goals in 2015, with target 14 (Life Below Water) designed to encourage sustainable fisheries for sustainable ocean use.

These codes and guides facilitate acceleration of the movement of sustainable fisheries, further leading the international governance, nations laws, and private sectors to sustainable management. They further help NGOs develop the guiding principles, and many organizations have accordingly developed their methodologies for fisheries certifications and ratings programs. The nexus of such certifications and rating programs around the world, including BSG, is expected for the smoother achievement of sustainability, as discussed in Chapter two.

Monterey Bay Aquarium is the leading institute that raises awareness for sustainable seafood consumption, as a scheme owner of SW. The aquarium launched the SW program in 1999 and started hosting the "Cooking for Solutions" event with music and sustainable food at the aquarium since 2001. The BSG team was inspired from this event and has hosted the Blue Seafood charity reception since 2013 in Japan; it invites over 350 social leaders every year. The regular guest lists

include the First Lady of Japan, diet members, the Governor of Tokyo, local politicians, business and social leaders, and Japan's top artists. Overseas VIPs including First ladies, Ambassadors, NGO leaders, and business leaders also attend the reception. This event inspires decision makers and media to partner with the BSG and support the social movement.

4.4 Conclusions

The academic pursuit of sustainable seafood consumption is the mission of transformative ocean science. This chapter mapped the stakeholders to attain sustainable seafood. It explained how each group transforms sustainable ocean science and provides strategies for improvement using the BSG as an example.

Degradation of the marine environment and the decline of fisheries resources are becoming increasingly severe, which cannot be solved solely by governments or specific stakeholders. The pursuit of a sustainable society requires the engagement of all stakeholders.

The collaboration of these stakeholders for the united goal of sustainable fisheries is the key to success and it is expected that government leadership can positively improve the relationships between the stakeholders.

This chapter found that the central government and the central administration have relatively soft power over the fishery associations, which causes the delay of drastic fishery reformation towards managed and sustainable fisheries. If the co-management system is as effective as stated by Ostrom, which has been discussed in the introduction of this dissertation, and Japanese fisheries are well co-managed, why is the stock decreasing in Japan? It may be because co-management is either not a suitable model for sustainable fisheries, particularly for small-scale fisheries in most countries, despite Ostrom's theory, or that in Japan needs to be fixed. In either case, the current fisheries management structure may not be perfect, and the governments and administrators should further ensure the appropriate implementation of the new laws, combat challenges such as recovering from unsustainable fisheries, and promote sustainable seafood consumption.

The next challenge is to confront the de-facto failure of sustainable fisheries in Japan and make drastic structural improvements. These challenges may be addressed by reviewing excessive subsidies from FAJ to JF and JFA, as declared in SDG 14 and suggested by the World Trade Organization. Consumers' demand for sustainable fisheries may be the driving force for such

improvement. Also, reforming unnecessary subsidies may improve the power balance between the government, administration, and fishery associations. Consumers should be aware of how those subsidies are provided since their resource is the tax they pay.

Suppose FAJ avoids confrontation with its special interest groups and fears being rebuffed by JF. In that case, it will need to be more effective in transforming Japanese fisheries and seafood consumption to be sustainable. The pursuit of sustainability may hinder the immediate interests of fishers, such as a short-term loss of income from catch limits or bans when the measures are implemented. Revisiting vested interests would be a difficult but necessary procedure. If this power relationship can be shifted or used positively, transforming Japanese fisheries into sustainable ones may become a reality.

Although there were some instances where the BSG have been used in government-sponsored international events hosted by Japan, they were facilitated by the efforts of the private sector, such as the venue hotels and chefs, who decided to use the BSG and not the government. The government may be able to learn from these experimental cases led by other stakeholders and proactively adopt sustainable procurement codes on their initiatives in the future.

Creating a local version of the BSG helps the growth of the local economy, as discussed in section 2.2. It will be an effective and speedy way if eligible NGOs continue working with local governments to reform the old-style fisheries to become sustainable with the related business on the supply chain to the consumers.

Scientists, especially fisheries scientists should be proud to contribute to a sustainable society, and the science institutions should consider having a financial base independent of subsidies. Governments and administrations should establish a system that includes the financial independence of scientific institutions that support them to generate scientific data free from distortions.

The BSG has been featured in many major media outlets over the past few years, proving that the media has significant potential to promote the sustainable seafood consumption movement to lead the implementation of transformative ocean science in the society.

This chapter also found that the further social acceptance of the sustainable seafood movement guide such as the BSG will expand the scale speed of its activities, while riding on the tailwind of the SDG movement will increase the consumption of sustainable seafood, and eventually create a social norm for the next generation. The study showed that all these efforts for changes should

be carried out simultaneously without missing any elements, and the driving force behind this social transformation may be the awareness of each stakeholder as hypothesized.

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Chapter 5

Conclusion

Marine fish stocks have globally declined over the past half-century. The UN urged to achieve the sustainable society by 2030. Therefore, raising awareness of sustainable fishery and seafood consumption has become an urgent challenge, especially in Japan. Implementing transformative ocean science to the society became a critical issue in realizing sustainable fishery and seafood consumption. UNDOCS selected the BSG as one of the examples of the implementation of the UN Decade of Ocean Science to the society in 2021.

This dissertation studied the multiple challenges for the sustainable fisheries and seafood consumption in Japan, including the lack of fisheries' scientific information for the evaluation of sustainability, lack of supply chain stakeholders' actions towards sustainable seafood trade, the need for more awareness of the sustainability role of each stakeholder group in the society, and the possible need of the further investigation for restructuring co-management system for the sustainable fisheries management. The BSG is a case studied whether the social implementation of transformative ocean science is realizable.

Regarding the lack of fisheries' scientific information for the evaluation of sustainability, Chapter 2 described how the BSG was developed as the first rating program in Japan by adopting international standards while also meeting the challenges posed by Japanese resource management, data constraints, and commerce culture. Until 2020, Japanese fisheries law was not supportive of managed fisheries, and necessary scientific data for the managed fishery for seafood sustainability was not the primary issue for the government to provide. The BSG witnessed and showed that scientific information became available only when the government became positive towards sustainable management, which requires the data. The procedure of creating the local version of BSG also proved that the local government must provide the primary fishery data for evaluation, which makes the creation of the local version of the BSG possible, which was realized by the BSG Mie Prefecture version and the Tokyo Metropolitan Government version. The data

on stock status is a kind that requires a large-scale investigation, and that research is a role of the government. Therefore, it became less challenging to collect necessary data such as harvest control rules and bycatch after the reformed fishery law was implemented in 2020, which mandates the Fishery agency further research the stock status and operate the harvest control rules. The science-Policy nexus is thus proved to be highly important through the study of the BSG.

No matter how much the information became rich, it is useless if the stakeholders do not utilize it. Regarding the challenge for the lack of supply chain stakeholders' actions towards sustainable seafood trade, Chapter 3 proved that the consumers in Japan are not aware of the importance of the seafood sustainability, and the lack of awareness and knowledge of the consumers is of the lack of information delivery from the seafood distributors and of the lack of general education in broad meaning. Fishers proactively obtained certification, citing the expansion of sales channels and contribution to sustainability. Meanwhile, the supply chain, including production, wholesale, and food and beverage companies, was more passive, and they obtained certification at the request of their customers. Half of the CoC-certified companies do not disseminate information to consumers. This fact found through this dissertation indicated that their efforts to reach out to consumers were insufficient. The survey also revealed future possibilities, with active efforts yielding positive responses, the growing popularity of SDGs, and the high expectations for a national campaign and enhanced education. However, not all stakeholders understand the importance of sustainable seafood use, therefore it is essential that stakeholders' efforts towards seafood sustainability are well communicated to consumers and that their choices are properly directed toward sustainability.

The science within each stakeholder is identified from the perspective of social implementation. Social implementation becomes possible by understanding the nature of society surrounding seafood sustainability. Therefore, by analyzing who is thinking what and acting with what logic, Chapter 4 clarifies the particular interests of each group, aiming to interpret the facts with their small science, their own interest. Transformative ocean science must be comprehensive so all stakeholders can agree upon it. The need for such science for more awareness of the sustainability role of each stakeholder group is clarified in this chapter. The pursuit of healthy sustainability may depend on a healthy balance of power. For example, as we found in Chapter 4, fisheries administration does not work well when the government is weak; as the first fisheries administration reform in 70 years was achieved under a strong government brought about by a

long-term administration lasting seven years and eight months, the administration will have difficulty implementing the new law unless it maintains government leadership, with the balance of power with a strong lobby from the fishing industry. One of the world's challenges is the elimination of wasteful subsidies. Until now, co-management has been considered excellent in academia. However, it is impossible to prove why fishermen are forced out of business, and the fishing population continues to decline if the structure is so wonderful. Therefore, this study raised a question if the co-management is imperfect and needs improvement. It also suggested that all stakeholders must work simultaneously and emphatically toward the sustainability of fishery resources. Japan's fisheries industry needs significant structural reform from politics and administration to the supply chain and consumers. To this end, the media can spread information, a business must distribute good products, and consumers must buy and support sustainable marine products. Academia, of course, has a vital role in further research on transformative ocean science and the immediate implementation of the research in society.

As studied, the success of the BSG is a certain recognition. The fact that the stakeholders recognized the objectivity and logic in the BSG means that social implementation is progressing. The BSG has created a mechanism wherein all stakeholders can come on board. That is a comprehensive initiative with a co-evolution mechanism. Lessons learnt that implementing the latest and updating the program is vital to avoid wasting time. In addition, the BSG platform itself will evolve in line with the latest scientific advances since it is a platform that has the power to tolerate the evolution of science as it develops.

Spin-off projects evolve together. For example, BBB develops based on marine science in the background, adding the findings of science related to health and beauty. The fact that the program provides a mechanism to utilize the results of complex sciences is a new approach to ocean science unique to the BSG. Regional BSG versions prove the ability of the BSG to transform to smaller scaled local fisheries and to the area where the supply chain is more dominant than fishers. It shows flexibility in proposing a region-specific approach that takes advantage of the characteristics of the local specialty and economy.

Therefore, the BSG helps seafood sustainability and broader social issues relating to sustainability with transformative ocean science as a co-evolutionary platform stemming from transformative ocean science, which has expanded its scientific scope beyond fisheries science. It has the capacity to evolve over a wide range of areas, from a detailed understanding of local conditions to the sustainability of national fisheries resources and the potential for application to

other areas or countries in the world.

Future research targets consumer behavior for sustainable seafood consumption. The literature review in Chapter 3 revealed that none of the significant general surveys for investigating consumer preference for seafood conducted by the FAJ or notable distribution companies asked about sustainability as a survey item. This fact shows that the questionnaires for the consumers of whether sustainability is a purchasing motivation were not anticipated in past studies with larger-scaled questionnaires. However, multiple advanced surveys exist for consumers' behavioral change toward sustainable consumption. While this dissertation was directed toward realizing sustainable fisheries, distribution, and sustainable seafood consumption by consumers, further investigation based on the original questionnaire survey using BSG for the consumers remains the next step to conducting scientific research on consumers' awareness and behavior toward the sustainability of seafood and society.

Also the further study is expected to analyze the characteristics and challenges of fishery's co-management system in Japan and to create sustainability in the fishery industry by implementing appropriate and time-tested structural reforms, based on the previous researches such as Makino presented. Future research also targets economic independence of fisheries, regional revitalization and education. As Ostrom et al. suggest, the pursuit of sustainability should include not only environmental protection, but also economic growth, and social development. When such challenges are realized, that is the success examples of implementation of transformative ocean science to the places where the new science is needed.

Transformative ocean science is a way of science with social implementation in mind. This dissertation showed how the BSG could be recognized as one of its successful examples. It is expected that, in one way or another, this dissertation and the study of the BSG can shed some light on the importance of transformative ocean science that will contribute to a genuinely sustainable society in the future.

Transformative ocean science is an interdisciplinary and transboundary science. It is hoped that this dissertation contributes to the goal of global environmental studies, which is to create a new system of knowledge for solving environmental problems based on several pillars as an academic discipline.

Appendix A

Questionnaire for MSC Certified fishers (original version was in Japanese)

Methodology: Google Form was used

Response period: January 14 - 24, 2022

Requested Text:

We would like to ask your favor to answer the questionnaire from those who have obtained MSC certification for the research at Kyoto University Graduate School of Global Environmental Studies. The result will be used for research and thesis purposes at the Kyoto University Graduate School of Global Environmental Studies. The results of your responses will be anonymous and your company name will not be linked to your answers. Thank you in advance for your cooperation.

Kyoto University Graduate School of Global Environmental Studies

Minako Iue, PhD candidate

minakoieue@icloud.com 09083824794

Entry Requirements

Name of Fishery Certification Organization

Name and title of person filling out the questionnaire

Contact telephone number

E-mail address

Questions

1 What is the purpose of your challenge to obtain MSC certification? Please check all that apply from the following. Please indicate any others. (Multiple answers allowed)

To promote sustainability to consumers

Want to contribute to sustainability

Expect to increase revenue

Expect to promote exports

Expect to improve CSR

Expect to improve ESG

Expect to improve corporate image

Expect to participate in the Tokyo 2020 Olympic and Paralympic Games

Enhancement of domestic competitiveness

Market expansion

Other

2 Why did you choose MSC certification over other certifications? Please check all that apply.
Please indicate any other reasons. (Multiple answers allowed)

- Internationality
- Credibility
- Recognition
- Cost-effectiveness
- Price
- Other

3 What difficulties did you encounter in obtaining certification? Please check all that apply.
(Multiple answers are possible.) Please list any others.

- Financing
- Complicated procedures
- Consensus building among fishermen
- Cooperation of distributors (e.g., CoC certification)
- Improvement of fishery prior to assessment
- Confrontation with opposing forces
- Pressure or opposition to certification
- Language barriers (e.g., English)
- Others

4 Was there a difference in the reaction from consumers before and after certification? Please select the appropriate answer.

- Yes • No • Neither • Don't know

5 Did you notice any difference in reactions from suppliers, retailers, restaurants, etc. before and after certification? Please select the appropriate answer.

- Yes • No • Neither • Don't know

6 Did the Tokyo 2020 Olympic and Paralympic Games trigger the acquisition of certification? Please select the appropriate answer.

- Not at all
- No, not at all
- Can't say either way
- Strongly agree
- Strongly agree

7 Did the social impact of the SDGs trigger your decision to obtain certification? Please select the appropriate answer.

- Not at all
- No, I don't think so.
- Can't say either way

Strongly agree

Strongly agree

8 What are your positive and negative aspects of the certification?

(Descriptive answers)

9 What do you think are the challenges for MSC certification in the future?

(Descriptive answer)

Appendix B

Questionnaire for CoC Certificate holders (original version was in Japanese)

Methodology: Google Form was used

Response period: February 17 - March 19, 2022

Requested Text:

We would like to ask your favor to answer the questionnaire from those who have obtained MSC/ASC Chain of Custody certification for the research at Kyoto University Graduate School of Global Environmental Studies. This is an academic contribution to the development of sustainable fisheries by considering the opinions of those involved in the fisheries industry who are leading the way in the production, distribution, and sustainable seafood consumption. The research will be used for the dissertation at Kyoto University Graduate School. The results of your responses will be anonymous, and your company name will not be linked to your answers and will not be made public. Thank you very much in advance for your cooperation.

Kyoto University Graduate School of Global Environmental Studies

Minako Iue PhD candidate

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Entry Requirements

Name of CoC certified organization

Type of Business

Type

Name and title of person filling out questionnaire

Contact telephone number

E-mail address

Questions

1 What is the purpose of your challenge to obtain CoC certification? Please check all that apply. Please indicate any others. (Multiple answers allowed)

To promote sustainability to consumers

Want to contribute to sustainability

Expect to increase revenue

Expect to promote exports

Expect to improve CSR

Expect to improve ESG

Expect to improve corporate image

Wanted to participate in the Tokyo 2020 Olympic and Paralympic Games

Increase domestic competitiveness
Market expansion
To respond to requests from business partners
To obtain subsidies
Other

2 Why did you choose MSC/ASC Chain of Custody certification over other certifications? Please check all that apply. Please indicate any other reasons. (Multiple answers are acceptable.)

Internationality
Credibility
Recognition
Cost-effectiveness
Price
Requests from suppliers
Prospects
Recommendation from NGOs, etc.
Other

3 What difficulties did you encounter in obtaining certification? Please check all that apply. Please indicate any others. (Multiple answers allowed)

Financing
Complicated procedures
Internal consensus building
Cooperation of distributors (e.g., CoC certification)
Improvement of internal system prior to audit
Confronting Opposing Forces
Pressure or opposition to certification
Language barriers (e.g., English)
Others

4 Was there a difference in the reaction from consumers before and after certification? Please check all that apply.

Yes • No • Neither • Don't know

5 Was there any difference in the reaction from suppliers, retailers, restaurants, etc. before and after obtaining the certification? Please check all that apply.

Yes • No • Neither • Don't know

6 Did the Tokyo 2020 Olympic and Paralympic Games trigger your certification? Please check all that apply.

Not at all • Not at all • Not at all • Neither • Yes • Strongly agree

7 Did the social impact of the SDGs trigger your decision to obtain certification? Please check all that apply.

Not at all • Not at all • Not at all • Neither • Yes • Strongly • Yes

8 What are your positive and negative aspects of the certification?
(Descriptive)

9 What do you think are the challenges for CoC certification in the future?
(Descriptive)

10 What media do you use to communicate to consumers about your CoC-certification? Please check all that apply. Please indicate any others. (Multiple answers allowed)

On our website
SNS (Facebook, Instagram, Twitter, etc.)
In-store POP, etc.
Newspaper ads, etc.
Flyers, etc.
Not specifically communicated

11 What else do you do to reach out to consumers regarding CoC-certified products? Please check all that apply. Please indicate any others (multiple answers allowed).

Sales fairs with an expanded sales floor
Sale of products at reduced prices
Sales of original products or menus
Educational activities inside and outside the store
Nothing in particular
Other

12 We would like to ask you about the status of sales of certified products. Do you always sell certified products? If so, how many species do you sell?

No, I don't sell them all the time.
Always sell about 1 type of fish
2 to 5 kinds of products are always sold.
5 to 10 species at any given time
11 or more types of fish are sold at any given time

13 How do the purchase prices of certified products compare to similar products that are not certified?

About 10% higher
About 5% higher
About the same
5% lower

10% cheaper

Other

14 How does the selling price of certified products compare to similar products that are not certified?

About 10% higher

About 5% higher

About the same

5% lower

10% lower

Other

15 What do you expect from consumers? Please check all that apply. Please indicate any others. (Multiple answers allowed)

They will prioritize to purchase certified products

They will pay more for certified products to cover the cost

Raise awareness of sustainability of seafood

Will look for and purchase MSC/ASC certified products online, etc.

Would like to be made aware of MSC/ASC certification

Other

16 Have you received any reactions from consumers regarding certification?

Very much, Yes, Not much, Not at all, Other

17 If you chose "very much" or "much" in 16, we would like to ask you. What kind of reaction have you received from consumers? (Free description)

18 In addition to fishery certification, there are other indicators and systems that indicate the sustainability of fishery resources. Are you aware of any of the following programs? Please check all that you know. Please indicate any others you are aware of. (Multiple answers allowed)

Japanese rating program "Blue Seafood Guide

U.S. rating program "Seafood Watch

Good Fish Guide" rating program in the U.K.

European rating program "Mr. Good Fish

I don't know anything about it.

Other

19 Do you know that Blue Seafood Guide also introduces MSC/ASC certification?

Know a lot, know a lot, don't know much, don't know at all, other

20 Do you feel that consumers in general are becoming more aware of sustainability and environmental considerations?

Very much • Feel strongly • Feel strongly • Not very much • Not at all

21 What do you expect the government to do to encourage consumers to choose sustainable seafood products? (Multiple answers allowed)

Tightening of regulations

Deregulation

Crackdown on illegal activities

Subsidies

Digitalization

Campaigns

Other

22 What do you think is needed to encourage consumers to choose sustainable seafood? (Free answer)