

New Strategy toward Sustainable Livelihoods in Coastal Fisheries-How Japanese Experiences Could Be Applied to Southeast Asia?

Achmad Zamroni ✉

Research Center for Marine and Fisheries Socio Economic, Ministry for Marine Affairs and Fisheries, Gedung BalitbangKP 1, Komplek Bina Samudera, Jl. Pasir Putih 1 Ancol Timur Jakarta, Indonesia

✉ Corresponding author email: roni_socio@yahoo.com

International Journal of Marine Science, 2018, Vol.8, No.8 doi: [10.5376/ijms.2018.08.0008](https://doi.org/10.5376/ijms.2018.08.0008)

Received: 04 Jan., 2018

Accepted: 26 Jan., 2018

Published: 09 Feb., 2018

Copyright © 2018 Zamroni, This is an open access article published under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Preferred citation for this article:

Zamroni A., 2018, New strategy toward sustainable livelihoods in coastal fisheries-how Japanese experiences could be applied to Southeast Asia?, International Journal of Marine Science, 8(8): 66-74 (doi: [10.5376/ijms.2018.08.0008](https://doi.org/10.5376/ijms.2018.08.0008))

Abstract Coastal resource management, community empowerment and socio economic development are the cornerstones for uplifting the lives of coastal area inhabitants. Japan is one of country who succeed to empowered economy of coastal community by diversify coastal and fisheries livelihoods. This study aims; to explore Japanese experiences on coastal resources management, to assess the fishing activity in case study area of Hiroshima, and to describe livelihood strategy in coastal fishery of case study area of Hiroshima. Primary data were collected from representatives of shrimp-trawl fishermen, and key informants using structured and semi-structured questionnaires. Secondary data such as statistical data and reports and books from previous studies were used as preliminary information. The data were analyzed by using descriptive analysis and qualitative contents analysis. The results of the study showed that Japan has many years' experiences to manage coastal fishery in effective and sustainable ways using community-based coastal fishery management and co-management approach. Meanwhile, Fisheries Cooperative Associations (FCAs) and Fisheries Management Organization (FMOs) are as institutional tools. In case study of coastal fishery activity, shrimp-trawl fishery in Akitsu has been manage by FCA, even the number of fishermen and their activity gradually decrease. However, the problems faced related to the sustainability of fishing activities in Akitsu is related to catch decreased, initial investment, regeneration of the fishing activities itself, and upwelling in the past. Increased a number of aging fishermen and no successors are another problems in sustainability of fisheries livelihoods. In fact, young people escape from the fishery communities to work in the cities and aging people remain in fishery community. This is occurred in shrimp-trawl fishery (*Sokobikiami*) in Akitsu. Therefore, local government as well as central government can expand the oyster culture by providing incentives or subsidies to attract young generation back to the area to pursue this business.

Keywords Coastal fishery management; Livelihoods; Japan

Background

Coastal resource management, community empowerment and socio economic development are the cornerstones for uplifting the lives of coastal area inhabitants. In Indonesia, livelihood development strategies established by the government in coastal communities are supposed to encourage and improve participation of coastal communities in diversified fisheries livelihood activities. These livelihood development and community empowerment activities are assisting to determine the success or failure of poverty reduction effort in the coastal areas.

Economic pressure to coastal resources has encouraged coastal communities to adopt pragmatic steps in coastal utilization and participation in government projects. The economic empowerment of coastal communities has always been an integral part of coastal management projects implemented by the central government through various local governments. Failed projects related to coastal resource management can be traced to the lack of attention on the development of local resource-based economy. This condition also leads to changes in the social structure and economic environment as a result of the community response to development in coastal areas. Participation of women in economic activity may provide them a role in the exploitation of coastal resources and business diversification.

Japan was succeed to empowered economy of coastal community by diversify coastal and fisheries livelihoods. Empowering woman in fisheries activity including processing activity and diversify the fisheries products were most key point on their successful. The success story of The Government of Japan to empower the people in coastal area might be lessons for The Government of Indonesia (GoI) to find out the solutions for many problems in coastal community empowerment, including their strategies. Even though the socio-economics characteristics are different between both countries, Indonesia might be learning the Japanese strategy on diversification, community empowerment, marketing, and technology innovation.

Fisheries resources provide one of the most important sources of support for millions of coastal inhabitants in Indonesia. People in coastal area are still heavily dependent on coastal resources. Alternative livelihoods development in Indonesian fishing communities may have starting point under the whole economic development in the region, which is needed to pay serious attention as a main point. There have been drastic changes in the last decade. Fishing communities are also required to improve their motivation and effort to adapt to any changeable environment that may negatively impact on society and the economy, especially for small-scale fishermen who will get the most direct impact.

Many efforts have been done by the Government of Indonesia to reduce the poverty during last two decades particularly in coastal community, but people who live in coastal areas are living under the poverty and are considered as very high rate (approximately 32 % of 16.4 million). Fishermen cannot be easily persuaded to go into such a diversification of their livelihood. In the case of a newly introduced livelihood that is considerably capital-intensive, the small-scale fishers could hardly start without any support. However, productivity-based fisheries development has contributed to various problems of social, economic and environmental nature as well as poverty, over fishing, and mismanagement problems at the local level.

Most of Indonesian coastal community has high dependency on the government project and donors. Technology innovation (applied technology) for fisheries livelihood diversification (processed products) has also difficult to developed and improved. They do not have a vision to make themselves independence on developing Small Scale Entrepreneur (SME) by supporting the governmental projects. It is because fishermen or families might be choosing the activities in order to support leaving from the (capture) fishery and reduce the dependence of household economy on capture fishery activity, considering those resource is becoming more uncertainly.

Therefore, this study has four main objectives; 1) to explore Japanese experiences on coastal resources management. 2) to assess the fishing activity in case study area of Hiroshima, 3) to describe livelihood strategy in coastal fishery of case study area of Hiroshima.

1 Materials and Methods

1.1 Study area

Survey in Japan conducted Akitsu *Cho* (town), Higashi Hiroshima *Shi* (city), Hiroshima *Prefecture* (province). Capture fisheries and aquaculture (mariculture) activities are conducted as a income sources in this area. Akitsu town is located in Toyota District, Hiroshima Prefecture, Japan. The total area was 65.08 km² with an estimated population of 12,023 or a density was 184.74 persons per km² (Figure 1).

1.2 Data collection

Primary data was collected by conducting desk study and field survey. Interviews were basically conducted in-depth and face-to-face interviews by using semi structure interview. Group discussions will also design to explore the perceptions of respondents. Respondent would be will select by using purposive random sampling method to fisheries officers, collector/traders, processing companies and woman/fishermen's wife. Secondary data will collect from research institutes, universities, statistics data, published books, scientific journals and other resources which are related to the research topic.

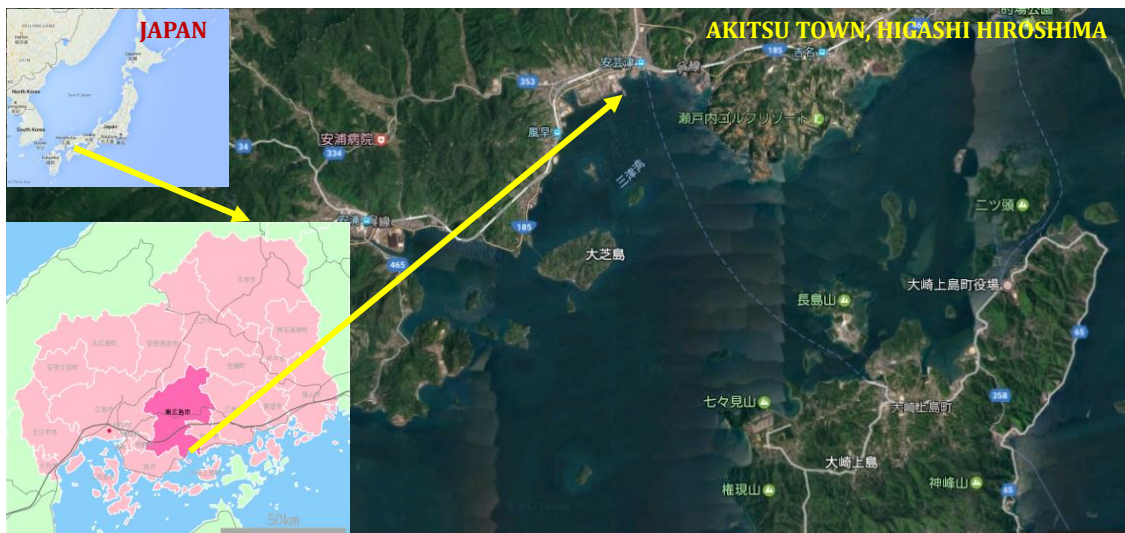


Figure 1 Research location in Akitsu Town, Higashi Hiroshima, Japan

1.3 Data analysis

This research adopted several types of analysis tools: 1) descriptive analysis, and 2) qualitative contents analysis. Descriptive statistics is the branch of statistics that focuses on collecting, summarizing and presenting a set of data (Levine and Stephan, 2005). Descriptive analysis will focus on socio-economic condition of respondents and the research locations, community activity and livelihood. The results were obtained from field observation and key informants' opinions, and informal. Qualitative contents analysis is used to analyze the contents of policy in coastal fishery management experiences in Japan. The essence of these policies have been picked up and discussed by using this analytical tool. Content analysis is a research method for making replicable and valid inferences from data to their context, with the purpose of providing knowledge, new insights, a representation of facts and practical guide to action (Krippendorff, 1980). Elo and Kyngas (2007) defined it as a method that may be used with either qualitative or quantitative data and in an inductive or deductive way. Deductive content analysis is used when the structure of analysis is operationalized on the basis of previous knowledge for the theory being tested (Kyngas and Vanhanen, 1999). Inductive content analysis is based on data movements from the specific to the general, and then particular instances are observed and then combined into a larger whole of general statement (Chinn and Kramer, 1999). Content analysis does not proceed in a linear method and is more complex and difficult than quantitative analysis because it is less standardized and systematic (Polit and Beck, 2004).

2 Results

2.1 Coastal fishery: brief review of Japanese experience

Fisheries in Japan are generally classified into three categories: coastal fisheries, offshore fisheries and distant water fisheries. Japanese coastal fisheries have complexity in resource uses and arrangements, including culture and capture fishery activities (Makino, 2011). The complexity is cover related to type of species, demarcated area setup for aquaculture, type of fishing gear, coordination among institutions/stakeholders, fisheries resource conservation, and other subsidies. To manage those complexities, Japan has many years' experiences to manage coastal fishery in effective and sustainable ways using community-based coastal fishery management and co-management approach. The concept of fisheries resource management in Japan is originally seen from the customary management practices in fishing community since the feudal regime. Those management practices have had implemented for shellfishes and seaweed. In other hand, as a key approach in fisheries management, community-based fisheries management (CBFM) initially started in 1977, when the Japanese Society of Fisheries Economics realized that there has been a paradigm-shifted in fisheries sector. Then, this is reaffirmed in National Fishermen's Congress-NFC (1979) that FCA should take transfer knowledge to community-based fisheries management. The next NFC in 1983 was also promoted CBFM to improve fisheries management in resource

utilizations by using scientific and rational manner. In modernization era, government was promoted the institutional arrangement fishery cooperative, which was mainly concerned in fishing ground management.

Japan has put the coastal community as a key element by giving some responsibility and authority in management matter. Represented institution such as cooperative (i.e. Fisheries Cooperative Associations-FCAs) and other fishing right are success story of coastal fisheries management tools in Japan, has been practiced from generation to generation. The high membership of FCA has contributed to the “Common Fishing Right”, which granted to FCAs by prefectural governors to manage the resources within the common fishing right zone, and allow their member fishers to work within the zone. The fishing right applied only for coastal fisheries, while offshore and high-sea fisheries are typically governed by a license system managed by central or provincial (prefecture) government (Uchida and Makino, 2008). Fishing right is divided into three categories, namely; 1) common fishing right that granted by prefectures only for FCAs with ten years’ term. 2) Large set fishing right and 3) demarcated fishing right. Demarcated and large set fishing right were granted by prefecture to FCAs and other organizations particularly to individuals within five years’ term. In term of demarcated fishing right, prefectures were granted only for aquaculture (Asada et al., 1983; Makino, 2011). From these categories, coastal community is involved in common fishing right. In Japan, common fishing right is commonly referring to the territorial use rights for fishing (TURFs) in municipalities boundaries, which governs the distance, fishing gears utilization and etc. (Christy, 1982).

Japan Fisheries Cooperative Associations (FCAs) are established in almost all along the coastal areas and/or fishing communities of Japan and coastal fishermen mostly are member of FCA. Approximately, at least more than one FCA exists in each municipality (city, town and village level), which is referred to as “FC A network structure”. FCAs have a three tiers structure namely, 1) FCAs at local level, 2) prefectural federations of FCAs at prefectural (provincial) level, and 3) a national federation of FCAs at national level (Figure 2).

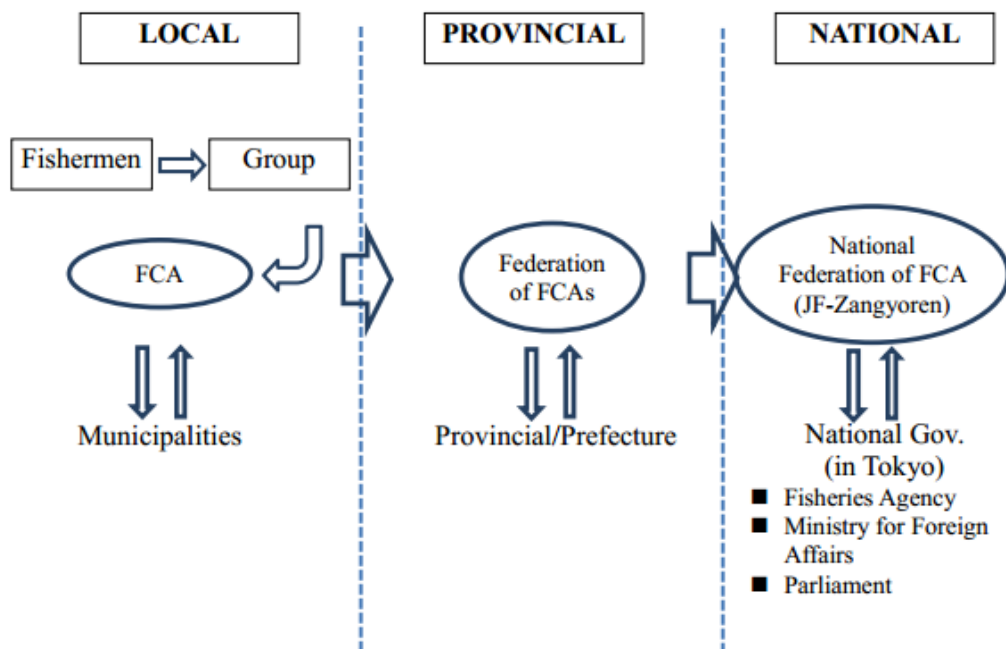


Figure 2 Structure of FCA network

There are 39 prefectural federations of FCAs (FFCAs) established in Japan. These FFCAs are engaged in business and non-business (guidance) activities as well as FCAs, including business credit and insurance. Zengyoren is engaged in various activities required in response and relation to the government’s policies and measures, i.e. guidance activities and supply of information to prefectural federations of FCAs, Lobbying activities to Parliament members and government agencies for support and other related international issues.

Besides FCAs, Japan has also fisheries management (FMOs) who represented co-management practices. Community management is defined as a sharing form of responsibility between government and society (stakeholder) to make policy that involves group of resource consumers, consultants and colleagues (Berkes, 1991; Jentoft, 1989). According to Ministry of Agriculture, Forestry and Fisheries (2001), FMO is an autonomous organization which consists of fishers' groups who shares the same fishing ground and/or operates in the same fishery and is collectively engaged in resource and/or harvest management in mutual agreement. Furthermore, about 95% of FMOs are operated by FCA or affiliated organization.

2.2 Small-scale trawl fisheries (sokobikiami) in Akitsu

The trawl fishing gear operated in Akitsu area and surroundings is about 26 units. This fishing method involves actively pulling a fishing net through the water (sea bottom) behind or more boats (Matiya et al., 2006). The distribution of trawl fishing gear in the area covers 6 (six) areas, i.e. Akitsu (9 units), Kamajima (3 units), Ocho (6 units), Osaki and Mihara (2 units), Karaji (6 Units). Currently, the total trawl (Japanese: *Sokobikiami*) in Akitsu operating on Seto Inland Sea is 9, this amount has decreased compared to the condition 30 years ago or around 1987, the total of trawls in Akitsu was 30 units. Trawl is operated by one boat with a captain assisted by 1 crew using 400 meters rope (Figure 3).

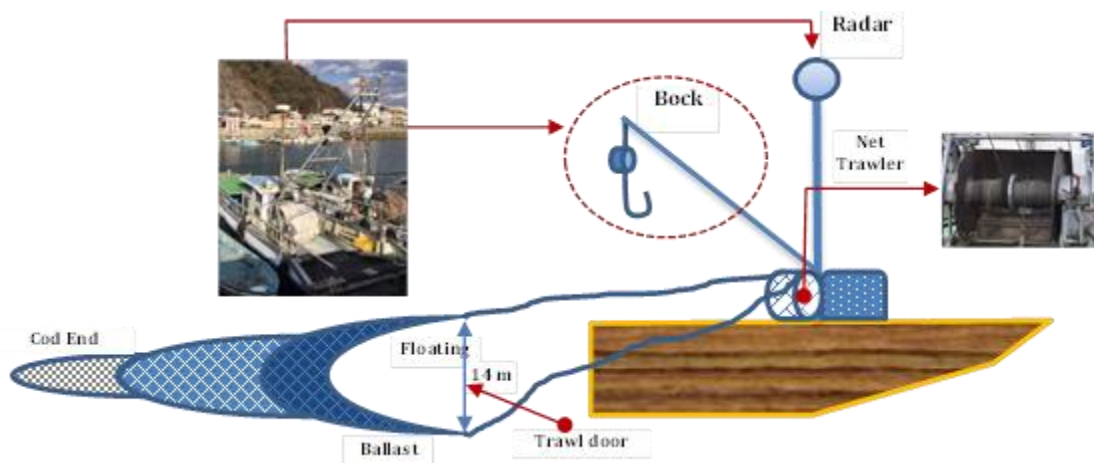


Figure 3 Shrimp trawl and fishing boat in Akitsu

The machine they use is 15 PK and boat weigh is 4.6 GT. The total of trawls in Akitsu is decreasing along with the aging fisherman. This operation of boat using trawl fishing gear occur day and night (one-day trip), starts at 07.00 (morning) up to 16.00 or 17.00 (evening) (afternoon operation). Then, the trawl boat that operated at night starts at 16.00 until 04.00 (morning). The distance taken to reach the fishing group is 1 hour (the farthest) and 30 minutes up to 40 minutes (the nearest). They set the fishing gear or catch the fishes for 4 (four) times (Figure 4).

The procurement of boat, machine, and fishing gear can be via direct purchase with initial capital of \15 million. The capital can be borrowed from the cooperation and returned within 9 years. The respondents, namely Sikasima-(77 years old) and Mitsumoto-(77 years old), state that they will continue catching the fishes by boat or if the machine is damaged". This is because they do not want to buy a new boat or machine due to the expensive price, they don't want to borrow more money, and age factor.

This trawl fishing gear is being used to catch shrimp and abalone, depends on the season in a year. There are 3 (three) boats that catch those 2 (two) species in one year. They catch abalone in January-April and continued to catch shrimp in May-December. In May, they caught shrimp (*aza ebi*) of 5-10 kg per trip, in June-September (peak season) it can have raised up to 10-15 kg of shrimps (*aza ebi*). Meanwhile, October-December is the peak season to catch shrimp of *siroi ebi* type, which can reached up to 30 kg per trip. Around 30 years ago or at around 198t, the caught shrimp (live shrimp) was exportable to Hawaii. However, the number has now far decreased the caught shrimp then sorted and steamed (on the boat). When the boat landed, the steamed shrimp is carried or sold

to the collector on the price of JPY 2000 per kg (January-May) and JPY 900 per kg on October-November due to the peak season and loaded shrimp stock. The operational day in a month is in average 7-10 days. Meanwhile, the expense per trip is JPY 12,000-JPY 13,000 that is to buy the 80 liters fuel (JPY 70/liter), oil and other fishing needs (Figure 5). In the Japanese system, collector's performance involves promoting strong collaboration, offering trustworthy information, accommodating a variety of needs, supporting the mission, and determining the price (Rawwas et al., 2008).



Figure 4 Fishing ground of trawl in Akitsu coastal area

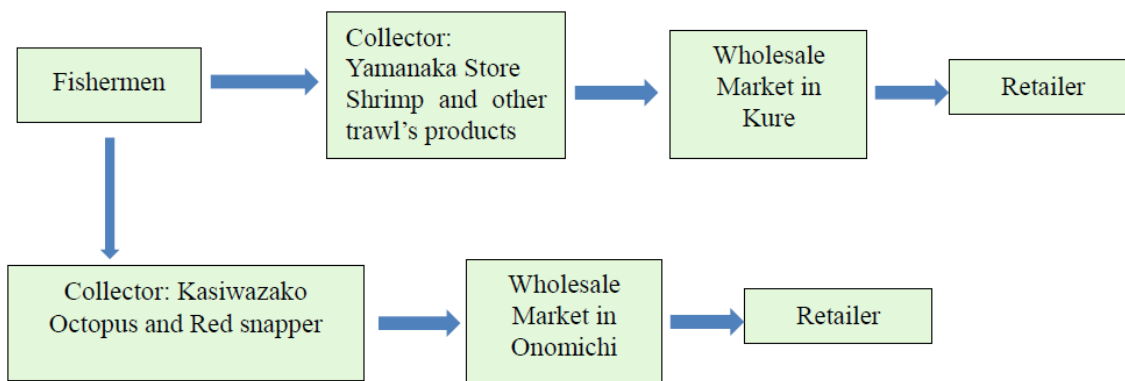


Figure 5 Supply chain of shrimp from trawl fisheries

The problems faced related to the sustainability of fishing activities in Akitsu are the decreased catch, initial investment, and regeneration of the fishing activities itself. Previously, upwelling is also a constraint at every transition of season. Meanwhile, factors such as fish price, government policy, law enforcement, water pollution, infrastructure and conflict are not considered as problems in catching fish by using trawl.

Most fisheries management case studies in Japan shows that after local fishermen experiences resource collapses, they change their approach and implemented strict management measures. They change or improved their management while the resource level was still recoverable. Natural science was a major catalyst for this change, since fishers are not always aware of the full ecological picture. Adoption of good management for one resource can increase overall economic resilience to sudden collapses in other resource levels. There are many types and form of co-management regimes, i.e. from instructive and consultative to informative (Berkes, 1994), or government-based, market-based or community-based (Copes and Charles, 2004). Each co-management regimes has specific features as to role sharing among relevant actors. Local fishermen are a key a player and autonomously manage in sedentary species management. But, in term of high migratory species, the government is a central for management measure.

2.3 Adaptation strategy for livelihoods

Coastal fisheries in Asia need relevant strategies to ensure future fish production and to improve the livelihoods or standard of living of coastal communities (Hurtado and Agbayani, 2002; Munoz et al., 2004; Stobutzki et al., 2006). A number of fishermen in Japan are aging steadily and decreased in every year. Meanwhile, young people escape from the fishery communities to work in the cities and aging people remain in fishery community (Takezawa et al., 2004). This problem is true and fact in shrimp trawl fishery (*Sokobikiami*) in Akitsu. Fisherman (owner) also takes the role as captain and the crew is his own wife. They do not have future successors due to their children in average 2-3 children per fisherman have lived with their own family and no longer stay in one house or one area with their parents. Fishermen don't need to catch fishes when the wife is sick or absent.

In Japan, women in fishing communities are engaged in various types of works. In some areas, they are engaged in fishing activities themselves together with their family members. In many other areas, women are engaged in sorting of fish by species and by size, after landing, and prepare for shipping the products by putting ice in the fish box. They are also active in clean the environment campaign, planting trees on the mountain and so on.

Women play double roles in productive activity and domestic (household) activity. The productive activity means includes pre and post-harvest, processing and marketing (Bennet, 2005). According to Zamroni and Yamao (2012), the roles of women in fisheries activity have a positive contribution to household and economic improvement and fisheries resources management. Housewives in Japan are traditionally the manager of family's finance. In FCA, women's group member keeps their books, and on the basis of this give advises on fishing business management matters, fishery insurance, life insurance and thus play an important role in helping improve management of fishing households, particularly in small scale coastal fisheries sector. As long as one group member is aware of empowering with others, co-management will be sustainable and co-management must be pursued in relation with other efforts to build the society (Jentoft, 2005).

Beside capture fisheries in the pass, fishermen in Akitsu *Cho* conducting oyster farming in coastal area within 10 meter indepth. Oyster farmers are usually get 20 ton/crop in average of each farmer with the pricing JPY 1,100/kg. In Akitsu, there are nine oyster farmers that divided into two categories; 1) two of them are farmer and as a trader. 2) The rest are only doing as a farmer. This farmer have production value is about JPY 80 Million to JPY 100 M per year of each farmer. This kind of business could overcome the problem on successor in fisheries activity of Akitsu. Local government as well as central government can develop the cultivation of oyster that already exists in Akitsu Area to overcome the problem of no successor for trawl fishermen. Oyster is becoming the flagship product in Hiroshima Prefecture still has a good market prospect, although high financial capital is required to develop them. Government can provide incentives or subsidies to encourage young people back to the area to pursue this business. However, fishers as individuals should undertake adaptation measures to respond to any changes in the situations (Grafton, 2010; Badjeck et al., 2009).

3 Discussion

Japan has many years' experiences to manage coastal fishery in effective and sustainable ways using community-based coastal fishery management and co-management approach. The concept of fisheries management in Japan is originally seen from the customary management practices in fishing community since the feudal regime, which is coastal community put as a key element by giving some responsibility and authority in management matter. Represented institution such as cooperative (i.e. Fisheries Cooperative Associations-FCAs) and other fishing right are success story of coastal fisheries management tools in Japan and has been practiced until to date. FCAs have a three tiers structure namely, 1) FCAs at local level, 2) prefectural federations of FCAs at prefectural (provincial) level, and 3) a national federation of FCAs at national level. In Japan, fishing right is divided into three categories, namely; 1) common fishing right, 2) Large set fishing right and 3) demarcated fishing right. Japan has also fisheries management (FMOs) who represented co-management practices, and about 95% of FMOs are operated by FCA or affiliated organization.

In case study of coastal fishery activity, shrimp-trawl fishery in Akitsu has been managed by FCA, even the number of fishermen and their activity gradually decrease. The trawl fishing gear in Akitsu is being used to catch shrimp and abalone, depends on the season in a year, which is 3 (three) boats specialized catch these both species during one year (January-April (abalone) and May-December (shrimp)). However, the problems faced related to the sustainability of fishing activities in Akitsu are related to the decreased catch, initial investment, and regeneration of the fishing activities itself. Previously, upwelling is also a constraint at every transition of season. Meanwhile, factors such as fish price, government policy, law enforcement, water pollution, infrastructure and conflict are not considered as problems in catching fish by using trawl.

A number of fishermen in Japan are aging steadily and decreased in every year. In fact, young people escape from the fishery communities to work in the cities and aging people remain in fishery community. This condition represents in shrimp-trawl fishery (*Sokobikiami*) in Akitsu, which fisherman (owner) as a captain working his wife as a crew. They do not have future successors in this activity. One of solution is fishermen and their family can do rely on pension fund scheme for continue their life, but it is not secure enough for another activity. Existing oyster culture business in Akitsu may overcome no successor problem, which women could involve in this activity. Local government as well as central government can develop the cultivation of oyster is becoming the flagship product in Hiroshima Prefecture still has a good market prospect, although high financial capital is required to develop them. Government can provide incentives or subsidies to encourage young people back to the area to pursue this business. Indonesia could adopt the strategies on institutional strengthening for coastal fisheries resources management and coastal economy to achieve the sustainable coastal community livelihoods.

Authors' contributions

AZ designed and conducted research, collected primary and secondary data, analyzed, review and interpretation. AZ is also arranged all things to completed this paper.

Acknowledgments

The author would like to express his deepest thanks to Professor Masahiro Yamao (Hiroshima University, Japan) for his constructive advises. The special thanks would like also convey to Dr. Michiko Amano (Hiroshima University, Japan) for joining field survey and valuable discussions; Dr. Mitsutaku Makino (Fisheries Research Agency, Japan) for sharing and interesting discussions. All Japanese respondents who share important information during field survey.

References

- Asada Y., Hirasawa Y., and Nagasaki F., 1983, Fishery management in Japan, FAO Fisheries Technical Paper 238, p.26
- Badjeck M.C., Allison E.H., Halls A.S., and Dulvy N.K., 2009, Impacts of climate variability and change on fishery-based livelihoods, *Marine Policy* 34(3): 375-383
<https://doi.org/10.1016/j.marpol.2009.08.007>
- Bennet E., 2005, Gender, fisheries and development, *Marine Policy*, Vol.29, No.5, pp.451-459
<https://doi.org/10.1016/j.marpol.2004.07.003>
- Berkes F., 1991, Co-management: the evolution in theory and practice of the joint administration of living resources, *Alternatives*, 18(2): 12-18
- Berkes F., 1994, Property rights and coastal fisheries, In: Pomeroy RS (ed.), *Community management and common property of coastal fisheries in Asia and the Pacific: concepts, methods and experiences*, International Center for Living Aquatic Resource Management, Metro Manila, pp.51-62
- Chinn P.L., and Kramer M.K., 1999, *Theory and nursing a systematic approach*, Mosby Year Book, St Louis
- Copes P., and Charles A., 2004, Socioeconomics of individual transferable quotas and community-based fishing community management, *Agriculture Resource Economics Rev* 33: 171-181
<https://doi.org/10.1017/S106828050000575X>
- Christy E.T., 1982, Territorial use rights in marine fisheries: definitions and conditions, *FAO Fisheries Papers*, 227: 10
- Elo S., and Kyngas H., 2007, The qualitative contents analysis process, *Journal of Advanced Nursing*, 62(1): 107-115
<https://doi.org/10.1111/j.1365-2648.2007.04569.x>
PMid:18352969
- Grafton R.Q., 2010, Adaptation to climate change in marine capture fisheries, *Marine Policy*, 34(3): 606-615
<https://doi.org/10.1016/j.marpol.2009.11.011>
- Hurtado A.Q., and Agbayani R.F., 2002, Deep-sea farming of *Kappaphycus* using the multiple raft, long-Line method, *Bot. Mar.*, 45(5): 438-444
<https://doi.org/10.1515/BOT.2002.044>

- Jentoft S., 1989, Fisheries co-management: delegating responsibility to fishermen's organizations, *Marine Policy*, 13(2): 137-154
[https://doi.org/10.1016/0308-597X\(89\)90004-3](https://doi.org/10.1016/0308-597X(89)90004-3)
- Jentoft S., 2005, Fisheries co-management as empowerment, *Marine Policy*, 29(1): 1-7
<https://doi.org/10.1016/j.marpol.2004.01.003>
- Krippendorff K., 1980, *Content analysis: an introduction to its methodology*, Sage Publications, Newbury Park
- Kyngas H., and Vanhanen L., 1999, *Content analysis (Finnish)*, *Hoitotiede*, 11: 3-12
- Levine D.M., and Stephan D.F., 2005, *Even you can learn statistics*, Pearson Prentice Hall, USA., pp.281
- Matiya G., Wakabayashi Y., Takenouchi N., and Abe S., 2006, Coastal resource and management in Japan: an outline of Kaminada fisheries in Futami District of Iyo City, Ehime Prefecture, *Mem. Fac. Agri. Ehime University*, 51: 15-24
- Makino M., 2011, Fisheries management in Japan: its institutional feature and case studies, *Fish and Fisheries Series 34*, Springer, pp.200
<https://doi.org/10.1007/978-94-007-1777-0>
- Ministry of Agriculture, Forestry and Fisheries (MMAF), 2001, *The 10th Fishery Census of Japan 1998*, Tokyo
- Munoz L., Freile-Pelegrin Y., and Robledo D., 2004, Mariculture of *Kappaphycus alvarezii* (Rhodophyta, Solieriaceae) color strains in tropical water of Yucatan, Mexico, *Aquaculture*, 239(1-4): 161-177
<https://doi.org/10.1016/j.aquaculture.2004.05.043>
- Polit D.F., and Beck C.T., 2004, *Nursing research, principles and methods*, Lippincott Williams & Wilkins, Philadelphia, PA
- Rawwas M.Y.A., Konishi K., Kamise S., and Al-Khatib J., 2008, Japanese distribution system: the impact of newly designed collaborations on wholesalers' performance, *Indust. Market. Manag.* 37(1): 104-115
<https://doi.org/10.1016/j.indmarman.2006.12.003>
- Stobutzki I.C., Silvestre G.T., Garces L.R., 2006, Key issues in coastal fisheries in South and Southeast Asia, *Outcomes of a Regional Initiative*, *Fisheries Research*, 78(1-3): 109-118
<https://doi.org/10.1016/j.fishres.2006.02.002>
- Takezawa M., Kubota S., Maeno Y., Yamada Y., and Takahashi N., 2004, Survey of fishermen attitudes in Japan, In C.A. Brebbia, J.M. Saval Perez and L. Garcia Andion (Eds.), *Coastal Environment V, incorporating Oil Spill Studies*, 2004, WIT Press, ISBN 1-85312-710-8
- Uchida H., and Mitsutaku M., in Townsend R., Shotton R., and Uchida H., 2008, Japanese coastal fishery co-management: an overview in case studies in fisheries self-governance, *FAO Technical Paper*, 504: 451
- Zamroni A., and Yamao M., 2012, People empowerment in livelihood activities toward sustainable coastal resource management in Indonesia, *International Journal of Science, Engineering and Technology, The Special Journal Issue*, 69: 589-595

© 2018. This work is published under <https://creativecommons.org/licenses/by/3.0/>(the “License”). Notwithstanding the ProQuest Terms and Conditions, you may use this content in accordance with the terms of the License.