As Ships Get Older, Shipbuilders Have Disappeared: A Survey on the Age of the Ships for Purse Seine Fishing and Shipbuilders in Nagasaki Prefecture

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Abstract

The purpose of this study is to describe and understand the age of ships for purse seine fishery in Nagasaki prefecture, Japan. We collected the data by means of fieldwork in September 2008 and applied to the authorities to show us the details of the registration documents. The results show two characteristics concerning the ships. First, the means of the age of the ships is about 20, and they vary depending on their construction material. Second, shipyards that have built such ships have disappeared during the past twenty years. It is likely that technological progress on fishing vessels has not been made for decades and it seems impossible for us to build new fishing vessel for the future.

Keywords: fishing vessel; purse seine fishing; age of ship; shipbuilder

1. Introduction

The purpose of this study is to describe and understand the age of fishing vessels and understand the condition of the ships.

Ships for fishing are essential equipment that is basically a production system for fishermen. Economical and safe ships are needed, and shipbuilders

seek to fulfill their requirements. Sometimes efforts by fishermen bring about a so-called overcapacity.

Authorities adjust the indicators, such as the number of ships or the license, and the tonnage of ships for resource management. In Japan, like many other countries, authorities try to control fishing efforts by adjusting the gross tonnage (G/T), the number of ships, and the power of the main engine mainly as a method of input control.

These indicators van be investigated easily, and we can apply them to resource management when knowledge concerning fishing resources is limited[1]. It includes large number of error[2][3][4]. First, it includes the influence of the technology progress[5]. The technology progress in the fishing system, such as a larger hull, a more powerful main engine, and more sophisticated fishing gear, is remarkable. As a result, newer ships undertake larger fishing jobs than the older ones, although the principal particulars of them are almost the same[6]. We, however, cannot determine the actual influence of technological progress on fishing, but it surely exist[7][8]. Sometimes buy-back programs effectively lead to diminished the fishing efforts[9]. They, however, accomplish their purpose. Authorities cannot estimate how they should diminish the ships to decrease the fishing effort. In addition, the number of ships noted in published statistics and the ones that actually operate are obviously different. Moreover, some ships are operated by" professional " fishermen and others by " amateur " fishermen[10]. The fishing effort differs qualitatively between the two sectors. Sometimes the indicators in use do not have any effect. Indicators like length and tonnage contribute up to 10% to the amount of fishery[11].

In sum, for resource management, the combination of input control and output control, like TAC and ITQ, is required[12]. In addition, we have to

improve the input control system by rethinking the usage of indicators, such as the skills of crews and the age of ships[13]. In fact, the productivity is different between brand-new vessels and older ones. However we cannot know the age of ships because the Japanese authorities do not publish this information.

2. Object and Methods

2.1. Object

The object of this study is ships specifically used for purse seine fishery,

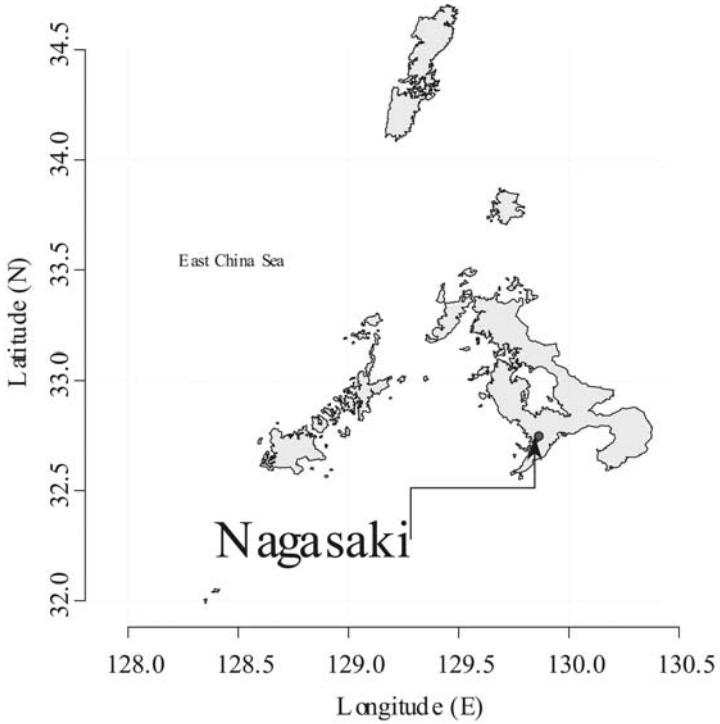

Figure 1: **Nagasaki prefecture, Japan**

with particular focus on ones in Nagasaki prefecture, which is located on the western side of Japan (Figure 1).

It is appropriate for us to use the fishery as a case study because it holds an important position in Japanese fishery. In 2008, the Japanese aggregate catch was 4,456,890 (tons), and catch from purse seine fishery was 1,357,968 (tons). The aggregate production value was 1,498,172 (M¥), and value from purse seine fishery was 154,229 (M¥) as a total. Figure 2 describes the amount of the catch by purse seine fishery in each of the Japanese prefectures, and Figure 3 describes the value respectively.

Around the country, most of the purse seine fishery is done by three kinds of ships: a purse seiner, a transport ship, and a fish scout boat.

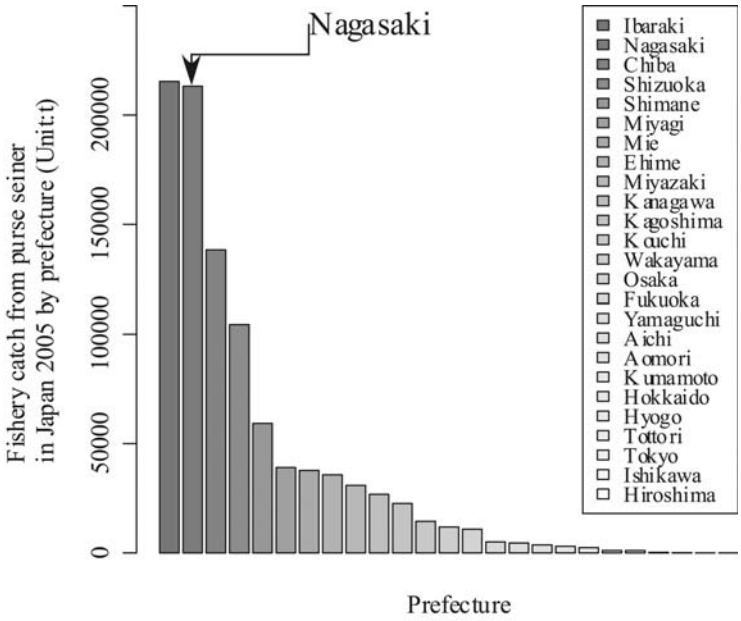

Figure 2: **Fishery catch from purse seiner in Japan** 2005 **by prefecture (unit:t)**

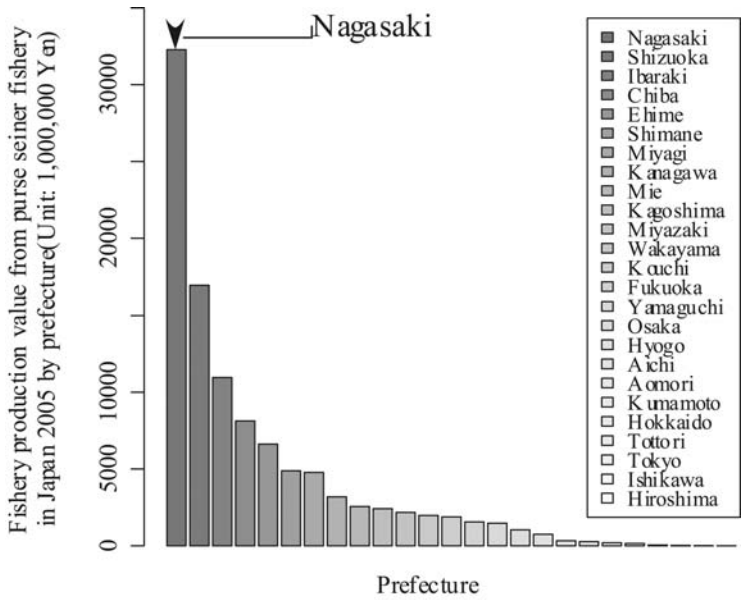

Figure 3: **Fishery production value from purse seiner in Japan** 2005 **by prefecture**(**Unit**:1,000,000¥)

A purse seiner holds the main position for the fishery. It spreads the net around the school of fish to catch them. Figure 4 shows a 19 (G/T) purse seiner that is made of FRP. Figure 5 shows a 135 (G/T) one of which is made of steel. Both of them are equipped with a power block, a line hauler, and other hydraulic instruments meant to operate the net.

The transport ship carries the fish that has been netted by the purse seiner to the fish market; a process that requires to be done quickly. It is required to carry the fresh fish speedily. Figure 4 shows a 19 G/T transport ship that is made of FRP. Figure 5 shows a 331 (G/T) vessel that is made of steel.

A fish scout boat seeks a fish school with advanced fish finder, sonar, and

Figure 4: **FRP purse seiner** (19**G**/**T**)

Figure 5: **Steel purse seiner** (135**G**/**T**)

Figure 6: **FRP transport ship**

Figure 7: **Steel transport ship**

Figure 8: **FRP fish scout boat**

Figure 9: **Steel fish scout boat**

other electronic instruments. In addition, light hung from the side of the boat attract the fish closer. Figure 8 shows such a ship that is made of FRP, and Figure 9 shows one which is made of steel. The instruments seen on the deck in Figure 9 are fish-luring lights.

2.2. Method

Collecting data about the age of the ships is difficult. We can only see the number, the registered tonnage, and the registered power of main engine of the ships in published statistics. We can, however, determine the age of a ship by means of the data described in the registration recorded. According to the Fishing Vessel Act, we have the right to request that authorities make available copies of the registration document. On the document, they record the ships' principal particulars, the shipbuilder, the launch year, and other useful information. We can calculate the ships' age with the information recorded on the documents.

We conducted the procedure as follows: first, we identified through government statistics the number and the mother port of ships engaging in fishery. In 2006, 151 of purse seiners and 438 transportation ships and fish scout boats were actively functioning. (For details, see http://www.pref.nagasaki.jp/toukeidb/jyouhou_koukai/download/f040120061.XLS.) Second, we went to the ports where the ships are located in order to verify the ships' names and registration numbers. We did this before and after the full moon. Since the ships stay in their mother port or undergo repaired at the shipyards during these days, we were able to check their names and registration numbers easily. As a result, we were able to correct a total of 176 of the ships in the prefecture. Third, we requested that the government make copies of the registration documents of the fishing boats based on the collected

information.

3. Results

3.1. age

The data show two characteristics of the ships' age. First, the mean of the age of the ships is around 20. Table 1 shows the descriptive statistics of age of the ships engaged in purse seine fishery around Nagasaki prefecture. Figure 10 shows the distribution of the age of the steel ships by the type of ship, and Figure 11 shows the FRP ships' age, respectively. For the steel purse seiners, the mean of the age is 20.8. For the steel transportation

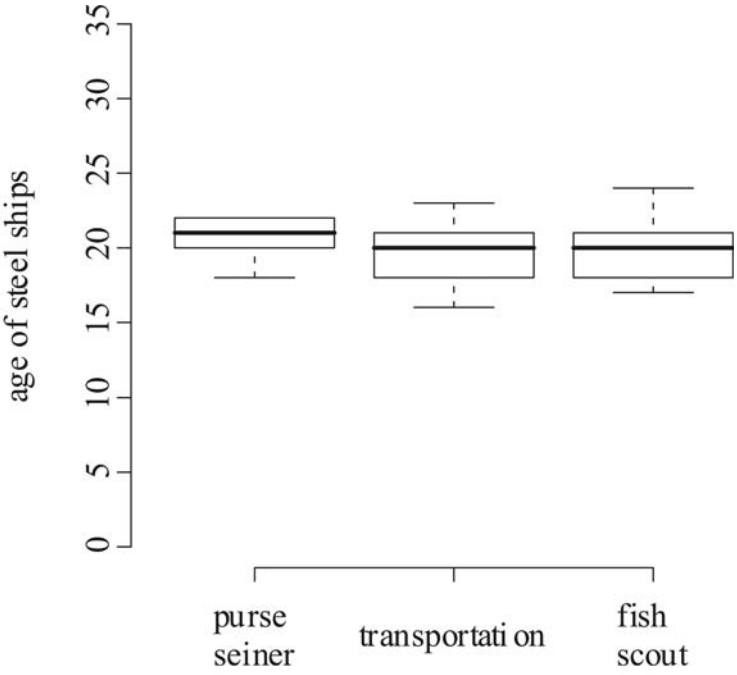

Figure 10: **Distribution of the age of FRP ships**

ships, the mean of the age is 19.7. For the steel fish scout boats, the mean of age is 19.7. There is not a statistically significant difference at the 1% level (Kruskal-Wallis Runk Sum Test, chi-squared statistics=1.86, df=2, p=0.39).

For the FRP ships, we confirm almost the same trend as that of the steel ships. For the FRP purse seiners, the mean of the age is 16.5. For the FRP transport ships, the mean of the age is 21.5. For the FRP fish scout boats, the mean of the age is 20.0. There is not a statistically significant difference at the 1% level (Kruskal-Wallis Runk Sum Test, chi-squared statistics=7.32, df=2, p=0.025).

Second, the variance of the age is different depending on the material of

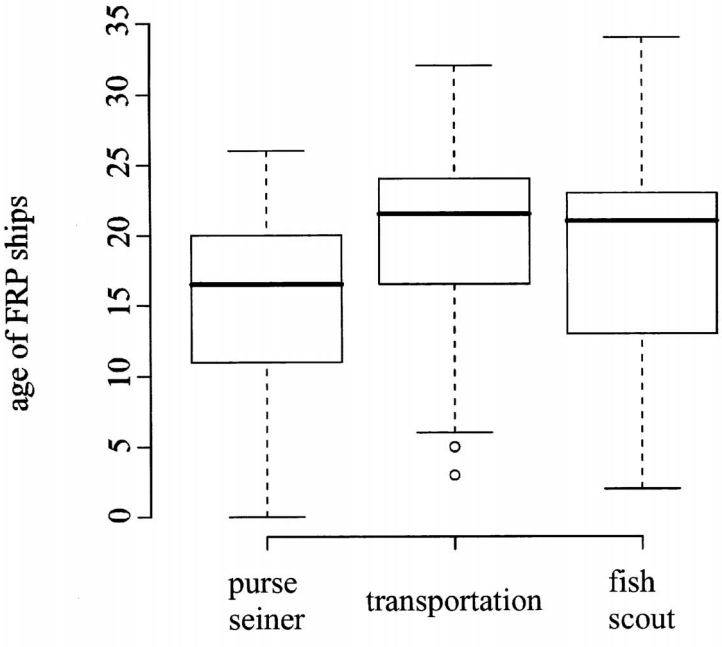

Figure 11: Distribution of the age of steel ships

the ships. Table 1 shows that the SD of the age of the FRP ships is larger than that of the steel ships. In addition, the Min of FRP ship is smaller than that of the steel ships and Max. of the FRP ship is bigger than that of the steel ships. For the FRP ships, the results means that brand-new ships and relatively old ships are operated in the same area.

material	usage	n	Min.	Median	Mean	Max	SD	SE	CV(%)
Steel	purse seiner	8	18	21.0	20.8	22	1.5	0.5	7.2
	transport ship	16	16	20.0	19.7	23	2.1	0.5	10.7
	fish scout boat	17	17	20.0	20.1	24	2.1	0.5	10.5
FRP	purse seiner	20	0	16.5	15.2	26	7.0	1.6	46.2
	transport ship	56	3	21.5	19.9	32	6.8	0.9	34.2
	fish scout boat	53	2	21.0	18.9	34	7.2	1.0	38.1

Table 1: **Descriptive statistics of the age of the ships**

3.2. shipyard

Shipyards that build ships for purse seine fishery have two characteristics. First, there are few shipyards with the expertise to build ships for this purpose. Figure 12 shows the number of FRP ships built by each of the shipyards. There are 29 shipyards that have the experience to build ships for fishery. Many shipyards, however, do not have this type of experience so much. For the FRP ships, the mean of the number of ships built by these shipyards is about 5. The number of the shipyards which have built more than five ships are five. For the steel ships, we can see a similar phenomenon as well. Figure 13 shows the number of steel ships built by each of the shipyards. There are seven shipyards that has experienced in building ships for a fishery. However, not many shipyards with the required expertise to build this type of ship exist. For the steel ships, the mean of the number of ships built by these shipyards are about 6.7. 4 of shipyards have built ships less than the mean.

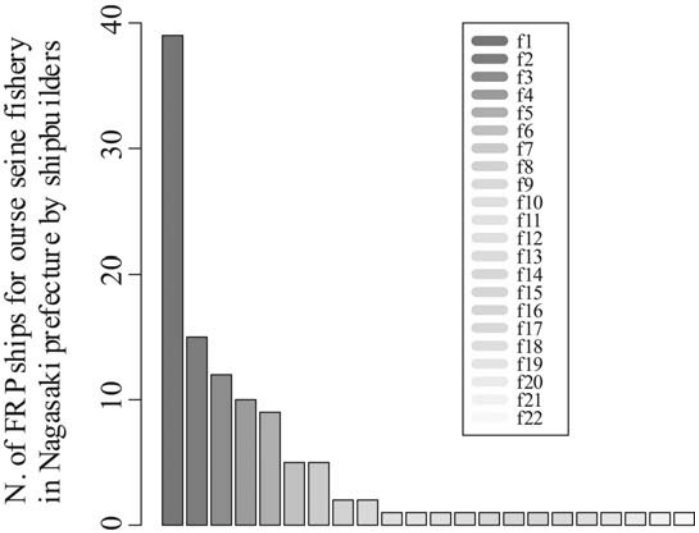

Figure 12: **N of FRP ships by shipbuilder**

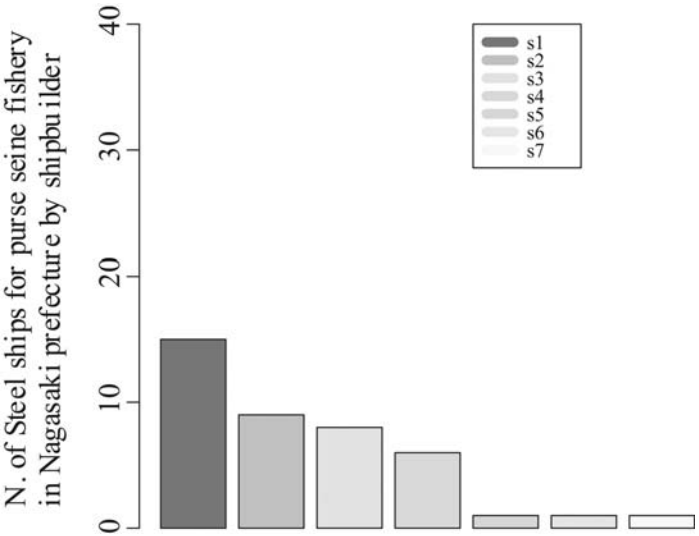

Figure 13: **N of steel ships by shipbuilder**

Second, there is little opportunity to build ships for fishing. Table 2 shows the descriptive statistics of the age of ships by the major shipyards,

shipbuilder	n of ships built	Min.	Median	Mean	Max	SD	SE	CV(%)
s1	15	16	20.00	19.53	22	1.77	0.46	9.06
s2	9	17	20.00	20.11	23	2.09	0.70	10.39
s3	8	18	21.00	20.62	24	2.09	0.74	10.14
s4	6	17	19.00	19.50	23	2.26	0.92	11.59
f1	39	0	20.00	16.36	31	7.6	1.22	46.45
f2	15	11	19.00	20.80	30	5.7	1.47	27.40
f3	12	2	16.35	13.50	20	6.9	1.99	51.11
f4	10	15	20.00	20.30	27	4.4	1.39	21.67
f5	9	18	26.00	24.33	31	4.3	1.43	17.67
f6	5	10	16.00	16.60	26	6.3	2.82	37.95
f7	5	8	21.00	18.40	22	5.9	2.64	32.07

Table 2: **Descriptive statistics of age of ships by shipyard**

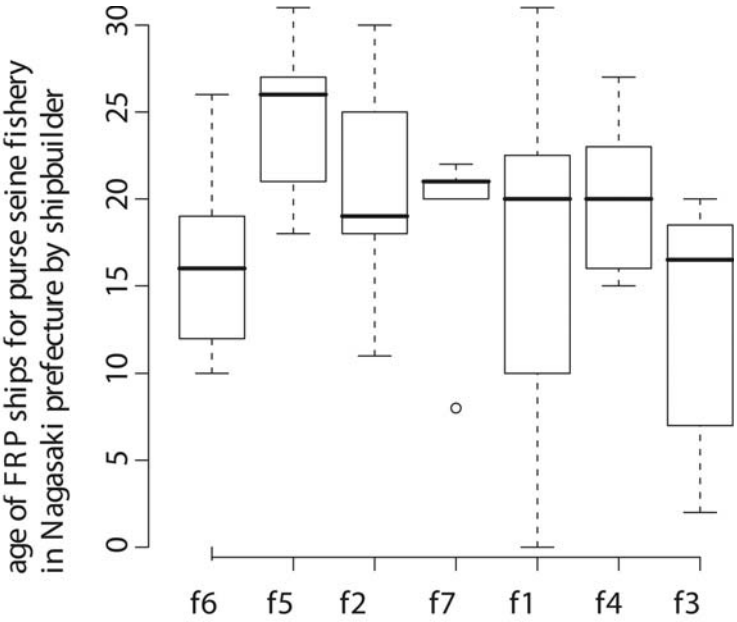

Figure 14: **age of FRP ships for purse seine fishery in Nagasaki prefecture by shipbuilder**

which have built more than the mean, respectively. Figure 14 shows the distribution of the age of the FRP ships by the 7 major shipyards. About 20 years ago, seven shipyards have build ships. In the last five years, however, only f1 and f3 shipyards have built ships. The remaining three 3 shipyards have not built ships for purse seine fishing. Furthermore, in 2008, we have confirmed that f4 and f5 shipyards disappeared. For the steel ship, the condition is more severe. No shipyards have built any ships for the fishery in Nagasaki prefecture for more than 15 years (Figure 15). Furthermore, in 2008, the s2 shipyard disappeared.

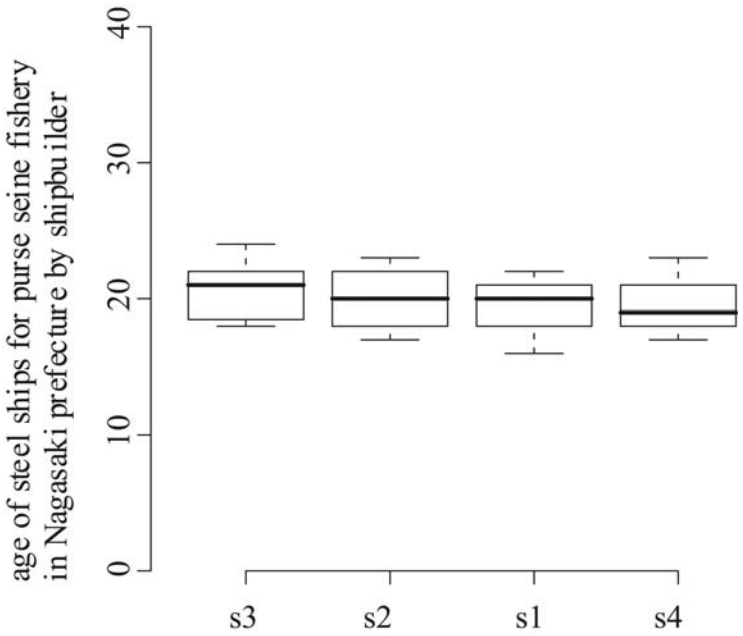

Figure 15: **age of steel ships for purse seine fishery in Nagasaki prefecture by shipbuilder**

4. Discussion and conclusion

In our study, on the age of ships for purse seine fishing in Nagasaki prefecture, we found two characteristics.

First, the means of the age is about 20. The variance of age, however, varies depending on the material of the ship. For FRP ships, it varies with the ships; old ships and brand-new ones are operated in the same sea area. For steel ships, it does not vary as much as it does with the ships made of FRP; some FRP ships continued to be replaced, and steel ships are no longer being replaced.

Second, shipyards that are good at building ships for purse seiner fishing have diminished. The number of expert shipbuilders that build either FRP or steel ships has decreased. Presently, there are five shipyards that can build the FRP ships, and there are four shipyards that can build steel ships. In addition, the number of both FRP and steel ships that are newly built has decreased.

This means that the shipbuilders have lost their knowledge and experience related to building such ships. There is a possibility that there will be only a few shipbuilders available if fishermen want to build ships suitable for their fishing style.

In conclusion, I should note the relation between the fishermen' s production system and productivity. The results show that fishermen catch fish using a production system that was developed 20 years ago. Steel ships in particular, may not be equipped with and may not use the, fruits of technological progress that have been developed during the past 20 years. In such situations, fishing efforts have not been improved technologically. It is good for us to preserve the fishing resources. However, the ships are unsafe due to

degradation of material and equipment. In addition, the skipper and crew of the fishery grow older, and the production system is required to fit such environment[14]. In order to retain the opportunity to develop and use new technology and to succeed in shipbuilding, we need to build new ship continuously, although the new ships will have some impact poor for the fishing resource.

Acknowledgment

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