

RESTORATION OF FISHING INDUSTRY'S SUPPLY CHAIN AFTER THE GREAT EAST JAPAN EARTHQUAKE

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Abstract: In the areas damaged by the Great East Japan Earthquake, it is an urgent need to provide employment opportunities. Unfortunately, however, the supply chain of fishing industry, which was important there, has broken down yet. This results in high unemployment rate. By examining the restoration process of other industries' supply chains including distribution and automobile industries, this paper concludes that the fishing industry's supply chain could be restored by concentrating their resources into particular business areas with the outside support from the central and local governments and stakeholders concerned.

1. INTRODUCTION

After the Great East Japan Earthquake, there is an urgent need to provide employment opportunities in the affected coastal areas where tsunami damages are serious. After people moved to temporary housing from the evacuation centers, they are expected to earn their living. However, the restoration of fishing industry, while considered important, is not progressing. This paper will discuss the reasons for the late restoration of the fishing industry in comparison with the distribution and manufacturing industries, and will explore important measures that can be employed in the future.

Hence, this paper tries to examine the reasons from the viewpoint of interdependence among the companies in supply chain which means that each company's production activities support other companies and are supported by others. Production will not be possible if each company cannot procure raw materials from upstream companies, if commercially produced goods by downstream companies cannot be marketed, and if logistics needed for the transfer of goods to consumers are not established. Restoration of particular production activities in a particular area depends on the restoration of the supply chain concerned. Therefore, in considering the restoration of the supply chain of the fishing industry, it is helpful to see how the supply chain of distribution and manufacturing industries were damaged and restored after the earthquake disaster.

2. SUPPLY CHAIN RESTORATION OF DISTRIBUTION INDUSTRY

Among the distribution industries, the major wholesalers

and retailers having nation-wide logistics network resumed operations in almost all of their stores a month after the earthquake. Although the distribution centers in the stricken area suffered a great deal of damage, distribution centers outside the affected area were made to function as substitutes, including distribution centers in Kansai area. For example, although Tohoku and Kanto Centers suffered a great deal of damage, AEON shifted to a logistics network system in which goods were supplied to each store in Tohoku area from the Chubu and Kansai Centers immediately after the earthquake. Afterwards, the Kanto and Tohoku Centers were restored in March and April, respectively, and has since returned to the system existing before the earthquake (Figure 1).

AEON supplied difficult-to-provide goods from a wide-range of areas and in some cases from overseas immediately after the earthquake. Even for milk, Kyushu's private brand (PB) products were delivered to Kanto area while Hokkaido's PB products were delivered to the Tohoku area. Moreover, emergency goods like mineral water from France, South Korea and Canada, and toilet paper from China were likewise imported (Yano, 2011).

Basically, substitution of goods exists in retailer business. If consumers do not find goods of a specific brand on store shelves during an emergency, they will buy goods of other brands. Even in a major retailer, it is not difficult to substitute goods that were produced by companies affected by the disaster since there are many manufacturers who wish to potentially start trade with the major retailer. Even before, the life cycle of goods has become considerably short so that it is a daily work for the major retailer to replace the goods on store shelves. For these reasons, major distribution companies were restored one month after the earthquake. It cannot be overemphasized that major distribution companies,

which were restored early, received benefits due to the reconstruction demand in Tohoku area.

In addition, restoration was long overdue for local retailers that could not easily receive support from outside of the stricken area. It is noted that major manufacturing companies as well as major wholesalers outside the stricken area could not but give priority to the supply of commodity to the major retailers. Although local small retailers have gone out of business to form shutter streets in old downtowns in Tohoku area for many years, the earthquake disaster accelerated this movement. In order to survive, local small retailers are urged to secure local original products and independent suppliers. The local governments may help local distribution industry with financial support from the viewpoint of city planning as well.

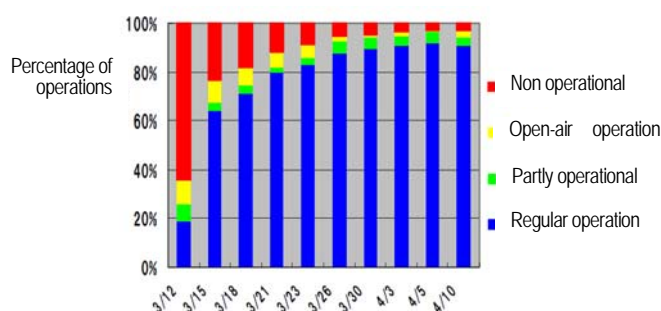


FIGURE 1 Business Recovery of the AEON Group (449 stores) Source: AEON Materials (<http://www.aeon.jp/information/pdf/110412R.pdf>)

3. SUPPLY CHAIN RESTORATION OF AUTOMOBILE INDUSTRY

In the manufacturing industry, the automobile supply chain gathered much public attention. Tier-2 and tier-3 parts suppliers, which supplied automotive electronic components for example, suffered a great deal of damage, and the production of assemblers in Japan as well as in the whole world stopped. Although each assembler was doing decentralized ordering of primary parts, tier-1 parts suppliers were consolidating their orders in the secondary and tertiary stages of the supply chain. In the production of parts which other suppliers cannot easily provide restoration of concerned factories is indispensable, and each assembler dispatched staff aids and strove for restoration. As a result, production has returned to the levels before the earthquake disaster just after six months.

Historically, assemblers set up major factories in Tokai and Kanto areas, and established the parts supply chain within the areas. However, after the 70s, production was starting to develop in Asian countries and parts required for production of automobiles were exported from Japan. Since high customs duties were imposed on imported cars, factories had to be established in each country even if the market size was small. After the 80s, in order to lessen the

impacts of a strong yen and ease trade frictions, production was likewise started in advanced countries, such as the United States (Nemoto, 2011).

Due to developments in the FTA/EPA, customs duties have been reduced for completely assembled cars as well as automobile parts, and integration of production bases has progressed. For example, in Bangkok (Thailand) and Guangzhou (China), concentration of assemblers and parts suppliers has progressed and most of parts can be supplied now domestically or from neighboring countries (i.e. 80 or 90 percent of parts supplied from within Asia and North America).

After the 90s, automobile factories were newly established in the Kyushu and Tohoku areas. This is because production capacity expansion of overseas factories was not able to catch up with an expanded world market. At the same time this has become the perfect opportunity to decentralize factories out of Tokai and Kanto areas in order to disperse disaster risk and also to establish new mother factories serving as a model in the case of overseas expansion. There are also support from academia and the government while parts supplier's concentration has also progressed gradually in Kyushu and Tohoku areas (rate of internal procurement is about 50 percent) and eventually suppliers have appeared to supply automobile electronic components to European and American assemblers.

The supply chain was thought to be a pyramid-type model (Figure 2), but after the earthquake disaster it was found that actual situation indicates a diamond-type model (Figure 3). Although the number of tier-2 and tier-3 parts suppliers is very large, electronic components were produced intensively by a limited number of companies due to economies of scale in production. In particular, substitution of several parts seems difficult (several months will be required for production to start even if alternate production is possible).

A typical example is the Renesas Electronics, which produces automotive electronic components. The company was formed through the merging of the semiconductor departments of Mitsubishi, Hitachi and NEC in order to survive intense global competition, and currently enjoys a 30 percent global share of automotive electronic components which controls the car engine. Although the company's Naka factory suffered a great deal of damage after the disaster which has significantly affected the world car production, assemblers and other companies concerned dispatched a maximum of 2,500 aid workers a day without pay to support restoration. As a result, the company was able to restore and reach pre-earthquake supply capacity several months ahead of the original schedule.

As an assembler's future measure, geographically dispersed sourcing from two or more parts suppliers are proposed. Through this, even if a certain parts supplier's factory suffers a great deal of damage, parts can still be supplied from another parts supplier. Also, for assemblers and parts suppliers, it is effective to educate people on the company's Business Continuity Plan, which carry out alternate parts production from other factories in times of

emergencies. Alternate production strategies of automotive electronic components may be established at production factories in Asia. It is important to standardize a production information system and institute a contract of production during emergency among these factories so that information required for production can be shared in a short period of time.

The automobile industry needed six months to be restored, or depending on one's viewpoint it can be thought to have ended in six months. For example, Toyota has attained the production volume in an average year within the fiscal year, with production increases covering the latter half of 2011. Although the problem of supply chain disruption was greatly raised immediately after the earthquake disaster, the influence was not so serious than we thought (especially when compared with the influence of the latest appreciation of the yen). In this regard it would probably be necessary to examine the cost effectiveness of measures that further shorten the six-month period in the formulation of a future Business Continuity Plan.

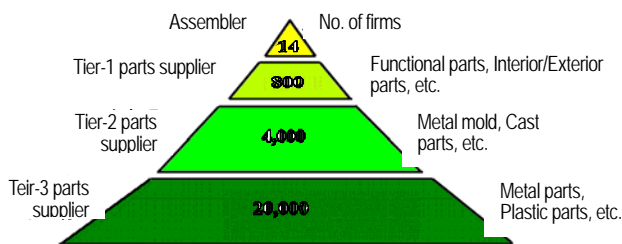


FIGURE 2 Industries Associated with Auto Production
Source: Takashima (2011)

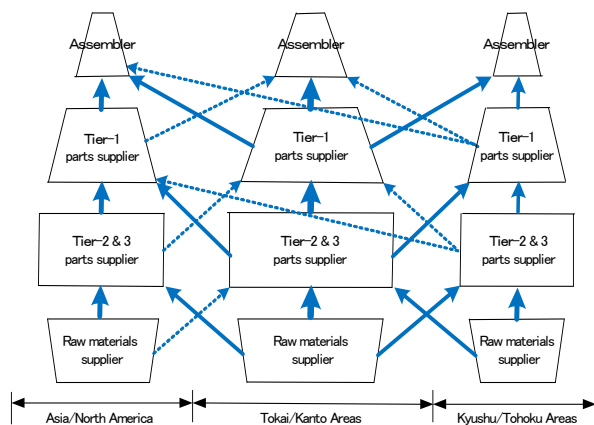


FIGURE 3 Global Supply Chain of Automobile Parts

4. SUPPLY CHAIN RESTORATION OF FISHING INDUSTRY

4.1 Damage in the Supply Chain of Fishing Industry

The fishing industry also suffered serious damage from the earthquake. Aquaculture facilities and more than 20,000 fishing vessels were greatly damaged. The Ministry of

Agriculture, Forestry and Fisheries has estimated the amount of damage at more than 1,200 billion yen (Table 1). Supply chain in the fishing industry was formed downstream by local traders, fish processing industries, wholesalers, retailers and local restaurants and hotels, and upstream by shipbuilding and repair industries and feed contractors for aquaculture. Among the companies constituting this supply chain, with the exception of wholesalers and retailers in consumer areas, many small and medium-sized enterprises are currently located around the local fishing ports suffered a great deal of damage.

There are a high percentage of companies that are affected in the above supply chain. These companies have weak financial standings due to reductions in fish catch in recent years and have no capacity to help other companies within the area. There is another serious problem that financial support is difficult for companies confronted with the "Double Loan". This is the problem encountered by the victims of disaster who already had loans or other debts for their businesses but were obliged to make new loans in order to resume their business. The assets which were mortgaged for the old loans had been destroyed or could not be used any longer after the disaster. Thus, support from outside is remarkably important.

Moreover, the fishing industry, which maintains fishing ports, loading/unloading and market facilities, has been receiving generous official support up to now (especially subsidy from the central government). Fishing industry-related facilities accumulated over several decades were seriously damaged. Damage to facilities operated by the private sector, such as fishing vessels and aquaculture facilities, accounted for a little less than 30 percent of fishery-related amount of damage. The remaining damage was done to public facilities such as fishing ports and joint-use facilities.

It is not easy to return these facilities to pre-earthquake conditions within a short period of time considering the severe financial situation of the local and central governments. The local government needs to define reconstruction priority immediately and improve the conditions by which private sectors can invest comfortably. For this, we appreciate the official decision that four fishing ports in Miyagi prefecture; namely Shiogama, Ishinomaki, Onagawa, and Shizugawa were prioritized from many fishing ports that suffered a great deal of damage in the prefecture.

Table 1 Damage in Fishing Industry

	Number of damage	Amount of damage (100M Yen)
Fishing vessels ¹	21,589 vessels	1,609
Aquaculture facilities ²		1,312
Fishing ports ⁴	319 ports	8,220
Joint-use facilities ^{3,4}	1,625 facilities	1,228
Total		12,379

Notes:

- 1) 12,023 were damaged out of the 13,570 vessels in Miyagi Prefecture
- 2) Includes silver salmon, scallop, oyster, sea cucumber, konbu, seaweed in Miyagi Prefecture
- 3) Loading/unloading and market facilities, freezing and refrigeration facilities
- 4) For joint-use facilities in the fishing industry, monetary aid from central and prefectural governments

Reference: Ministry of Agriculture, Forestry and Fisheries (2011.8.9)

4.2 Promoting Aquaculture with Private Enterprises

Using Miyagi Prefecture as a case study, the supply chain restoration policy of the fishing industry is explored below.

The amount of fishery production of Miyagi Prefecture in 2005 is 83.0 billion yen. The peak year of production was in 1985 with 120.0 billion yen. Out of the 83.0 billion yen output in 2005, deep-sea fishing comprises 30 percent, offshore and coastal fishing 35 percent, while aquaculture 35 percent. The value of production has decreased rapidly due to tightening of fishing regulations on international deep-sea fishing and reduction in fish resources. Offshore and coastal fishing is also required to comply with strict management due to reduction in resources. On the other hand, the value of aquaculture production has followed an increasing trend because of achievements in fish farming techniques, including increased number of fish species suitable for aquaculture. Therefore, Miyagi Prefecture has drawn out a plan for the promotion of aquaculture as a future important business field (Miyagi Prefecture, 2009a).

According to Miyagi's inter-industry table, the amount of shipment is 60.4 billion yen while the fishery production of 83.0 billion yen (Figure 4). This implies that fish landed in Miyagi is distributed all over the country. Although efforts to expand local consumption should not be spared, supply chain formed until now rests on the assumption of distributing to the whole country, and it is necessary to aim at resurrecting the supply chain on a national scale as a target.

To resurrect the supply chain, it is necessary to make a mechanism for cooperation with companies outside the disaster area. For example, scallops, oysters, sea cucumbers, wakame seaweeds, silver salmon, etc. are bred in the prefecture. Although a fixed brand is already established, it is necessary to introduce fish stocks with high marketability and to develop processed marine products. It is possible to

begin aquaculture with high productivity with an incorporated company, by receiving support from major distribution, trading, e-commerce and door-to-door delivery companies, etc.

In this sense, there is great expectation for special private-led investment areas for fishing revival, which Miyagi Prefecture advocates. If competition among fishermen cooperatives and private companies are promoted, structural improvements in fishing may be pursued by consolidating fishing ports, introducing private investments and opening fishing rights. Although fishing rights is given free at this time, it is possible that the government requires bidding, and charges usage fees to those who have fixed qualifications in the future (Hatta, 2010). For fishing industry, it might be better to get investors who can manage resources well and can perform high productivity fishing. Newly established firms have to change fishing into an appealing industry.

4.3 Promoting Accumulation of Fish Processing Industry

Fish processing industry was being located in Miyagi Prefecture at Kesennuma, Ishinomaki and Shiogama. The industry types are frozen processed foods (91.1 billion yen in 2007), fish pastes (48.1 billion yen), frozen marine products (31.8 billion yen), and other processed foods; e.g., salt-preserved dried foods (120.6 billion yen). Among these, frozen processed foods include battered fish ready for fry and sliced raw fish that use locally-produced mackerel, shark, and imported codfish and flounder. The sasa- and age-kamaboko, which are national brands, are contained in the classification of fish pastes. Moreover, frozen marine products which required minimal processing includes saury, bonito, and mackerel.

As shown in the inter-industry table, fish processing industry procures 99.2 billion yen of raw materials from the fishing industry of Miyagi Prefecture having a value of production of 83.0 billion yen. An import of 95.9 billion yen from outside the area is compensating for the insufficiencies. Incidentally, concerning fish pastes, after the decline in fish catch in the North Sea, fish are supplied from the United States and Southeast Asia.

The concentration of companies in the Miyagi Prefecture as a fish processing base induces an advantage, and it can also be said that the concentration encouraged developments. Especially important is the interaction on the increased sale in market landings due to the concentration of fish processing companies, and on new location of companies because of the increased sale (Miyagi Prefecture, 2009b).

However, landings were reduced due to limitations in fishery resources in recent years. Furthermore, as experienced by the recent disaster, the earthquake damaged a lot of fish processing companies. At present, there is apprehension on whether each company would reconstruct their factories within the prefecture, especially now that the concentration of companies has been lost. In particular, there is no reason for companies, which import raw materials and

ship products outside the area to rebuild within the prefecture.

Miyagi Prefectural Government has aimed at resurrecting the supply chain on the basis of reviving concentration of fishing industry in Kesennuma, Ishinomaki and Shiogama. For that purpose, it is necessary to emphasize anew the advantages of locating in Miyagi Prefecture. For example, brand values of materials can be redefined by using locally produced fish stocks and aquaculture products and newly developed processing technologies, etc. If brand value increases, support of major distribution companies which have marketing know-how can be expected. For Miyagi Prefecture, without the restoration of fish processing companies, the reconstruction of the fishery supply chain will not be possible.

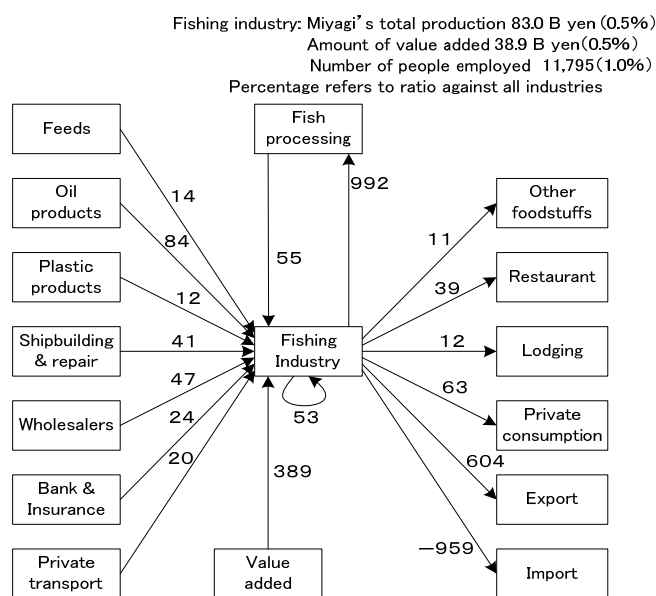


FIGURE 4 Relationships of Businesses in Fishing Industry of Miyagi Prefecture (Units: 100M yen)
(2005 Inter-industry Table)

5. CONCLUSION

From an investigation of the distribution and automobile industries, it was clarified that support from outside the disaster area is important for the restoration of supply chain. The reason why firms outside the disaster area give support is because it is advantageous or indispensable to its production activity to restore the supply chain. Manufacturers who want to start dealing with major distribution companies will absolutely cooperate in the restoration of the logistics network. Similarly, since the whole supply chain will stop if specific parts are not supplied, all companies constituting the automobile supply chain will have to unite and be in charge of restoration.

Due to limitation of fishery resources, the value of production has been decreasing which has weakened the fishing supply chain. Moreover, production facilities such as

fishing ports have been improved using subsidies from the governments. Therefore, when fishing vessels and other production facilities are lost at once due to an earthquake disaster, self-reliance restoration is difficult. Probably, it will be necessary for the governments and the private sector to concentrate investment on a promising area and industry type (e.g., expectations for aquaculture's high earning capacity). Major distribution firms' support, introduction of fish stocks which meets consumers' needs, development of processed marine products, among others, will lead to the supply chain restoration of the fishing industry.

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