

Role of Skilled Workers in a Successful Supply Chain: The Case of the Japanese Seafood Processing Company

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Abstract. This paper describes the skilled workers in a local seafood processing company in Japan as best practice for producing successful innovations. The analysis shows the workers contributed to innovating production and supporting supply chain management. The breakthroughs they created were examined in this study, and the key factor of success (KFS) was analyzed using the participant observation method. One aspect is workers' skills (fast work, accuracy, quality, etc.) being useful for cost efficiency and product quality. The company trains workers to develop skills and expertise in all process lines to ensure high production output. The observation of the production process and examination of the business history indicates a mutual influence between innovative strategy and skilled workers. The company has a strong collaborative relationship with production and marketing that can respond to customer needs by optimizing production, processing, distribution, and sales as a value chain that creates added value and has successfully innovated in production and distribution. The skilled workers supported building a business model that responds to customer needs. This study shows the positive circulation of social capital between skilled workers and successful supply chain management.

1 Introduction

Japan has one of the world's finest seafood industries. With a rich history, a robust maritime culture, and an abundance of fisheries resources, Japan is a major player in the production, processing, and consumption of seafood, which is highly favored because it plays an important role in the nutrition and consumption needs of Japanese people. Consequently, the annual per capita consumption of seafood in the nation is expected to be 70.6 kg in 2024,

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while the global average is 15.9 kg. In addition, seafood consumption increased per capita from 1961 until 2019. The country is also one of the top importers of aquatic animal products after the USA and China [1]. Demand for fish in Japan continues to grow, driven by population growth and an increasing awareness of the health benefits of eating fish.

Fish is an important part of Japanese culinary culture and is served in a variety of traditional dishes. Furthermore, Japan is one of the largest fish-producing countries in the world, with a total annual catch of 4.5 million tons in 2020 [2]. Therefore, the seafood industry is expected to continue growing because of strong local and global demand for high-quality seafood. The most commonly caught fish in Japan include tuna, salmon, mackerel, and pollock. Japan has a modern and sophisticated fishing fleet that operates around the world and has a large and growing fish processing sector that produces a variety of products such as sashimi, and sushi.

The country is famous for its innovative technology in processing and preserving seafood. Hence, its products are exported throughout the world and are highly sought after for their quality and taste. Japan's exports of agricultural, fishery, and forestry products reached a record 1.45 trillion yen (US\$9.9 billion) in 2023, an increase of 2.9% over 2022. The increase was driven by larger shipments to Hong Kong and the USA [3]. Considering the unstable state of supply and demand as well as the global trade in seafood products, ensuring a stable supply of seafood products for the general public requires Japan to increase its seafood production in conjunction with appropriate imports while at the same time ensuring the sustainable use of fishery resources [4]. The country is committed to developing a sustainable and responsible seafood industry that minimizes its impact on the environment [5]. To ensure that the resource base is harvested sustainably, Japan has a long history of effectively managing the fisheries of its coastal communities [6], [7].

Researching one area in Japan that excels in fisheries is important to research for a better understanding of best practices in resource business and management. This research will be another perspective as a comparison in viewing the topic of resource management and business. This research has the potential to enrich the literature study on the topic of resource management and business. In this research, Company A was studied to determine the best business practices in the context of analyzing the indicators for successful innovation in the seafood industry. In Japan, the seafood industry was once so successful that many Japanese companies in this field gained huge market share. However, in the 2010s, fishery products in Japan lost competitiveness and market share. Despite this loss of competitiveness and market share, the success of Company A is noteworthy and suggestive. Determining what made them so successful and why they were able to innovate is the objective of our study.

2 Methods

Determining the state of production and marketing management as an important part of the supply chain is one reason for studying one company (Company A) in the Uwa Sea region. However, this research focuses on the work of skilled workers in production facilities and innovations for marketing. Skilled workers are the main factor in supporting successful supply chain management. Thus, in the study of Company A, the key factor of success (KFS) is discussed using participant observation.

In this study, we investigated how Company A uses skilled workers as an intangible asset and an effective business resource and how it built a competitive strategy by using this business resource. The company has a supply chain model that almost all companies in the Japanese seafood industry use. By studying the company as a model for best practice and analyzing its KFS, the implications for a management strategy can be obtained.

Company A was selected as the subject of this research. It is generally difficult to obtain detailed information on the seafood industry and to determine why the industry is excellent not only in terms of human resources but also the business aspect. Researchers have conducted investigations using the participant observation method. Company A has a successful supply chain management, so it is relevant as the subject of this research. Because many seafood companies in Japan and overseas have not developed and expanded [8], the KFS of this enterprise is suggestive.

A qualitative research method called participant observation involves actively engaging with a specific group of people and observing them in a given physical and social setting. The aim of the study is for one or more researchers to gather data while keeping theoretical problems in mind. In the past, participant observation has been used to document the real-life experiences of many cultural groups in remote locations [9]. In addition to the literature review, direct interviews with top managers, middle managers, and employees of the subject company was essential to clarify the KFS and identify implications. The research questions in this study were as follows:

Q1)What was the KFS in using skilled workers and innovations?

Q2)Regarding the answer to Q1), what led the company to eventually achieve successful supply chain management?

2.1 Description of the Business

In the agroindustry, supply chain management is concerned with managing a network of facilities and distribution routes, sourcing the raw materials, and manufacturing and shipping the final products to customers [10]. Company A is a seafood company that has successfully innovated in production and distribution, which added value to the supply chain [11]–[14]. It has also developed a business model that responds to the market needs of its customers. Company A's business starts with purchasing farmed fish (sea bream, yellowtail, and tuna) directly from producers and processing them in the company's plant. The company collaborates with an experimental station to develop innovations. Currently, one such innovation is Ehime's signature orange fish, in which the fishy smell has been eliminated, making it more palatable to consume. Company A also collaborates with a sushi restaurant chain, and exports to several countries, such as the USA, China, and India, to expand marketing channels.

2.2 History of the Enterprise

The owner of Company A started the business after realizing there were problems with the distribution of seafood products. On looking at the price of seafood products in a city store, he saw that the fishermen were paid only about one-quarter of the total amount. Upon further investigation, the owner discovered that the amount returned to the fishermen was minimal and that the numerous vendors in the distribution channel were the source of high fees. As the number of people working in the local seafood sector declined, the owner began to develop a system that allowed fishermen to sell directly to customers to increase their income, as shown in Fig. 1.

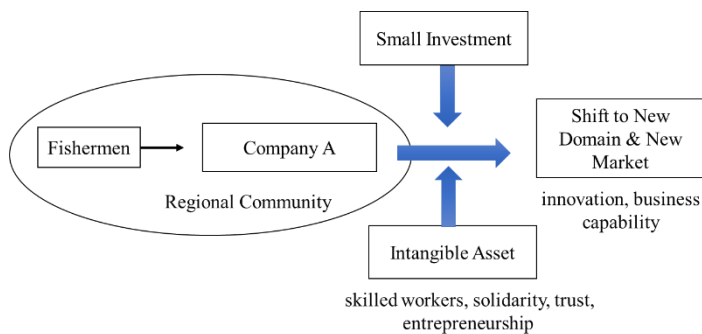


Fig. 1. Strategy for innovation by using an intangible asset

Company A was established in 2010 in Ehime Prefecture, Japan, to produce and market seafood products. The company works with fishermen to farm fish in the Uwa Sea, specifically yellowtail, sea bream, and bluefin tuna. Seafood is processed based on what customers want. “Orange Fish” or “Mikan Fish” are produced by combining the residue from citrus processing with feed. Resulting in the fish being fresh with a subtle fruit flavor. Producing such fish is accomplished by taking advantage of the characteristics of Ehime Prefecture, which is at the forefront of citrus innovation in Japan. The fish’s reputation for its fragrant aroma is helping to make it increasingly popular. Orange Fish, which was created and marketed in 2012, became well known when it was adopted by a major Japanese sushi restaurant chain. Subsequently, Orange Sea Bream and Orange Salmon were created and are now popular both at home and abroad. The company is being touted as a model for regional redevelopment because of its innovative concept of combining fish and mandarin oranges, two local resources, to create new value for sustainability and resilience [15].

2.3 Products and Services

Company A sells orange fish, which has been developed throughout the country and has been called “fruit fish” in recent years. Most of the fish feed is made of orange residues from a beverage maker, mixed powder, and small fish. Mixing orange residues (such as orange peel and dregs) suppresses the decomposition of fish flesh and provides a light orange flavor. The company has a partnership with another company to produce fish feed. This feed is more expensive than regular feed, so it is produced only upon customer order. Producing to order can reduce risks such as overproduction. In addition, the price of orange fish can be fixed and does not fluctuate for producers. Enabling them to make stable profits and sell to customers at fixed prices. In addition, Company A also partners with a sushi restaurant chain as a permanent sales channel to supply orange fish. Women and children who do not like the fishy smell can eat orange fish [16].

Company A processes three types of farmed fish: bluefin tuna, yellowtail, and red sea bream. The fish have been farmed with great care in fishing grounds and are quickly processed. Fresh bluefin tuna can be used to prepare dishes such as sashimi, sushi, and kabuto-yaki (roasted fish heads). Farmed yellowtail fish from Ehime and Kochi prefectures have fatty flesh. The yellowtail can be prepared to make sashimi or used in shabu-shabu (hotpot dish) and is cut into easy-to-eat pieces. Frozen red sea bream, which is just two pieces from one fish, is available in a Japanese style, such as grilled, boiled, and steamed with sake, and in a Western-style, such as roasted in the oven. Filleted red sea bream can be enjoyed as sashimi.

2.4 Technology and Business Model

Production lines for frozen fish operate daily using manual and machine processes, but mostly human labor. The main production work is processing fish into products (such as frozen fillets and frozen slices). The production flow begins with procuring or receiving fish from fishermen. The fish are packed in large boxes filled with ice, with each box containing around 100 fish. When receiving fish shipments from fishermen, workers take samples and check the quality of the fish, such as temperature, weight, and physical appearance. The workers then document the fish quality data to ensure the fish is in good condition in preparation for the next process. The production process then begins with removing the fish's head (with a cutting tool). The worker checks the cut of the head, and also usually cuts the fish's beak to make it neater. Company A's production is characterized by the need for skilled labor. For the loyalty and solidarity of regional workers in the system of lifetime employment to be beneficial to the development and accumulation of technical expertise, they need accumulated tacit knowledge and long-term experience.

The next process is cleaning the belly, which is cut in half, and the entrails removed. The belly is then thoroughly and quickly cleaned with a spoon and brush until the blood, dirt, and fat are removed. The belly usually turns white when it is clean. After that, the fish meat is cut into fillets. A worker cuts the fish carefully so that the meat is separated from the bones, producing two fillets from each fish. The fillet is then colored using a special needle-like tool that injects carbon monoxide into the fillet so that the flesh becomes red.

The next process is to remove water from the fillet using tissue paper. Workers pat the fillet thoroughly and quickly with tissue paper to dry it in preparation for packaging. The fillet is then put into plastic packaging and weighed to determine if the fish meat exceeds the marketable weight standard. If the fish meat is too small and light, a worker will sort the meat into special packaging. The standard marketable weight must be above 1.7 kg. The weight is categorized with one fish fillet in the range of 1.7–1.9 kg, 2.0–2.29 kg, 2.3–2.39 kg, 2.4–2.59 kg, or 2.6 kg and above. Each weight category is sent to customers in the USA, India, and Taiwan, and each customer usually asks for an accurate weight classification. Non-standard fish (such as those below 1.7 kg or of worse quality) are distributed directly to markets such as Aeon Mall.

The quality of Company A's fresh seafood products is consistently maintained because Japanese consumers prefer fresh seafood. These seafood products can be produced to order, so Company A adapts to consumer needs, a business model that is important for the company. Most of its products are custom-made for each customer, thanks to the skills of its workers, an intangible asset [17]. The benefit of such skill is being able to provide products to order, which is advantageous in building strong relationships with customers and taking the lead in setting product prices. In this sense, the business model can be described as a combination of production and services.

Company A has partnered with Shimabara Kamaboko to mass-produce good quality jakoten (fried fish paste). Jakoten is a calcium-rich product with the unique flavor of small fish. It is made from fresh small horse mackerel caught in the Uwa Sea, ground together with their small bones, and fried for a fragrant aroma. Jakoten can be served as a snack with an alcoholic and as a side dish for children. Vegetable jakoten is a slightly larger jakoten made by mixing minced jakoten with carrots, onions, and burdock. The sweetness and texture of the vegetables with the jakoten make it delicious. Jumbo jakoten is about 1.8 times the size of regular jakoten, thicker, and more filling, and is used as a snack with alcohol or as a side dish at the dinner table.

2.5 Skilled Workers

Workers' skills (fast work, accuracy, quality, etc.) are useful for cost efficiency and product quality. Based on our observation, Company A has three types of workers on its production lines: permanent, non-permanent, and contract. Permanent workers not only work on the main production but also do support work, such as photographic documentation of fish quality that does not meet standards, coordination, and preparation of production. They work full time from 7 am to 5 pm. Any overtime entails working until midnight and on weekends (with additional pay). Non-permanent workers work from 8.30 am to 4 pm on main production only, processing fish into products (such as frozen fillets and frozen slices). Contract workers are like permanent workers but are contracted for a fixed period. They can stop working or renew their employment when the contract is over. They work from 5 am to 5 pm or until midnight if there is overtime.

The workers on main production jobs (permanent and contract) are mostly foreign workers aged 22–29. They come from Indonesia (mainly), Vietnam, and Bangladesh. The non-permanent workers who do the main production work are mainly Japanese women aged 70–78. Even though the older women workers are in their 70s, they are energetic and not inferior to the young workers aged 22–29. The ratio of foreign workers to Japanese workers on the main production process is 60:40. Company A's production depends on the workers' skills because the production process cannot use fully automated machine technology. Shift work is done by the non-permanent workers only. It cannot be done by permanent and contract workers unless there is an urgent requirement (sickness or holidays).

3 Results and Discussion

3.1 The KFS of Company A

1) Company A started in the conventional business of fishing. However, the owner uncovered demand for processing fishery products. In our participant observation, the manager said the company always has the latest innovation strategies, such as a jakoten stick (fried fish paste) made from fresh small mackerel. Furthermore, the company grew fast, so it also developed promising new lines of business. The strategy to enter a growing market was an important factor in the company's success. In this study, changing the market domain required strong marketing initiatives and bold entrepreneurship. The company consistently moved into the growing market for lucrative products. Because of its service capability, it was able to protect its business from infiltration by larger companies or other competitors. The market was not big enough for larger companies or competitors, and such a maintenance service was not profitable for the larger companies. The small investment for the fixed costs in the company was relevant in gaining profit for such a niche business [8]. Combining manufacturing and service was a good strategy to build the foundation of their business. This key decision was made by management based on the KFS.

2) The company worked to develop new products and marketing strategies to change market segments. It even tried to develop products using advanced materials. In our participant observation, Company A successfully produces fruit fish and chocolate fish. This strategy opens the market segment, such as women and children who do not like the fishy smell can eat orange fish [16]. Regardless of the situation, the management team worked hard to use their management resources and create cutting-edge products. In addition, they improved their products at every stage of the business to enter new markets. They constantly thought about entering new markets and introducing new products, which is a KFS for the company. Through these initiatives, the company could also expand into the international market.

3) The accumulation of tacit knowledge among workers with high levels of loyalty, solidarity, and skill is also critical. The majority of workers in the seafood industry are locals who have worked almost all their lives in one company. In our participant observation, the majority of workers are local residents, such as in the production section, the majority of female workers are 70s years old. In general, Japanese women aged 70–78 have retired, but the company still retains them because the workers' skills are still very qualified. In addition, the sector is located in rural areas, which has been a useful component in gaining their support and loyalty. The business community has been positively influenced by the industry and treated with respect. The development of the sector has been influenced by the well-established positive relationship between the region and the industry. The company developed its competitive competency in the local and domestic markets first, then progressively expanded to the worldwide market. The strategy for expanding the firm was well thought out to make a profit at each stage and an even bigger profit at the end.

4) Company A trains workers to develop skills and expertise in all process lines with the aim of ensuring that if one process line lacks workers, other workers can be used on that line. In our participant observation, with the principle of orientation to customer needs, Company A also provides training to all workers on slicing fish for sushi. Machine technology cannot do this work, so it is an added value to the Company A business. Developing the skills of one worker takes 1–3 months. This sliced product also depends on customer orders so that customers can determine the characteristics of the sliced product they want, such as fish slices with or without skin. This is one of Company A's strategies to achieve customer satisfaction and loyalty. The thickness of one slice of fish is around 3 cm, and the weight of one slice is around 7–9 g. Depending on customer orders, any fish can be processed into slices for sushi. For example, one farmed sea bream fillet weighing 2 kg can produce 60 slices.

3.2 Implication for Successful Innovations in The Supply Chain

Unlike many Japanese enterprises, Company A lacked advanced technology and large financial resources. Typically, to succeed in the seafood sector takes significant investment and highly experienced labor. However, the company gradually created unique technology, enabling it to become a competitive business. In addition, they established a solid relationship with their customers through standardized specifications, maintenance services, and specialized technology, making it difficult for competitors to infiltrate. To defend their company against competitors, Company A combined modest, creative products, skilled labor, and a shift in the industry.

Company A's management policy is to create added value in production, processing, distribution, and sales, as shown in Fig. 2 and Fig. 3. The two main goals are to build a system that creates added value [18], including producers, trading companies, and consumers, by improving a system where good-quality products are evaluated fairly to bridge the gap between producers and consumers, and to provide feedback to fishermen. Company A's product types are diverse (fillets, processed by-products, frozen, chilled, and solid) and oriented towards consumer needs and preferences.

Company A collaborates with a sushi restaurant chain and exports to several countries, such as the USA, China, and India, to expand marketing channels. Company A's products are marketed through several channels. First, products are marketed to restaurants or entrepreneurs through direct negotiation, understanding customer needs, and getting new product suggestions. Second, products are marketed to domestic customers directly and through wholesalers. Third, products are marketed to foreign and domestic customers through trading companies, wholesalers, and distribution cooperation. The company has a strong collaborative relationship with the production and marketing areas. The strong information system centered on Company A creates demand by sharing information, which

makes it easier to accurately understand supply conditions for producers (aquaculture/fishermen) and demand conditions for distribution companies, trading companies, retail outlets, restaurants, domestic markets, and export markets. The company conducts business in the processing sector and wholesale trade. However, it can respond to customer needs by optimizing production, processing, distribution, and sales as a value chain that creates added value [16].

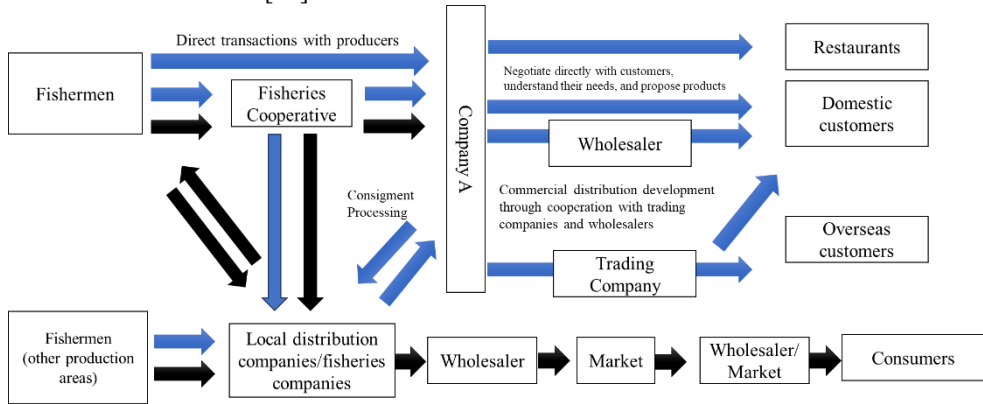


Fig. 2. Company A’s distribution channel [16]

Company A has good risk management. In the company’s supply chain, risk is not confined to one part of the business but distributed to each part, and it must be managed, for example, the quality and quantity of the price of fish along the supply chain [19]. Products are jointly developed with major retailers and other actors exploring sales methods. Consequently, sales have increased from year to year. The business strategy is to purchase material from producers through direct transactions and fishery cooperatives. Business also results from purchasing these materials with local distribution companies or other fishing companies on consignment.

The results of this study form the basis of a recommendation for many other Japanese seafood companies because Company A’s strategy was quite different from most of the major seafood companies. Moreover, an intangible asset-based strategy is believed to be particularly advantageous for sustainable growth and development in the globalized world [20]–[23]. In our participant observation, Company A provides training to all workers on slicing fish for sushi that the weight of one slice is approximately 8 g, and machine technology can not slice the meat for sushi. The role of skilled workers in slicing sushi will support the innovative production and supply chain of the company. Hence, this is able to strengthen the connection between the theoretical frameworks on intangible assets and the real-world practices observed at Company A.

Another aspect to consider is that although Company A began as a low-profit, locally focused business, it has evolved into a company that is active in a more promising global market. The decision to gradually enter the international market was important. In addition, the company expanded its resources by acquiring intangible assets such as skilled labor, and through the bold entrepreneurship of its top managers, and the credibility and solidarity of its employees. Despite its lack of tangible assets, the company had certain intangible assets that it had worked hard to accumulate. For large companies or start-ups with sufficient capital, this is somewhat ironic. Companies do not need to accumulate intangibles or make incremental advances if they are endowed with tangible assets. This allowed the company in this study to play to its strengths.

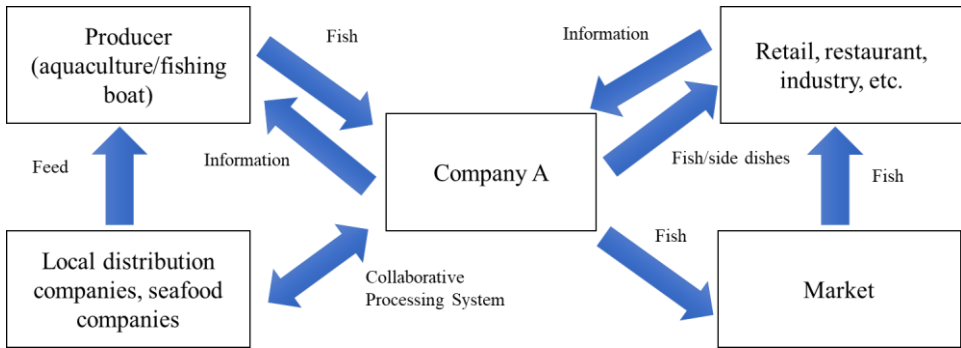


Fig. 3. A business platform centered on Company A

Employee involvement within companies and throughout the supply chain significantly affects social sustainability performance, which results in improved job satisfaction, motivation, human resource development, and morale. Eliminating waste results in improved resource use when team members at all levels of the supply chain network are involved and made aware of sustainability initiatives. Empowered teams are the engines of innovation for more socially and environmentally responsible goods, services, workflows, and supply chains [24].

4 Conclusion

Company A was studied to determine the implications for the promotion of manufacturing SMEs (small and medium enterprises) in Japan’s fisheries sector. This research discusses the broader implications for other seafood companies and industries, including specific, actionable insights. Based on participant observation, the role of skilled workers is important to consider. Specific skills that support company production have the potential to be a strategy in addition to considering the need for high-investment funds and technology.

Having direct conversations with top management, middle management, and employees was helpful in elucidating the KFS of this company. In conclusion, the company has accumulated a series of small-scale innovations for creative products, knowledgeable labor, and the market domain. This allowed it to gradually move the business into previously unexplored and highly differentiated markets, known as “blue ocean” markets. As a result, the company eventually acquired highly competitive competencies in these sectors. The domains it has access to are expanding with the aim of creating new channels in the international market. The ability to enter these channels has been critical to the expansion of its business.

Instead of making a significant financial investment, Company A leveraged its intangible assets, which included bold entrepreneurship, flexibility, quick judgment by top management, tacit knowledge, and credibility based on employee loyalty and solidarity. This was the starting point for its series of incremental advances. It is also the reason why large companies and start-ups with substantial investments rarely see things this way. The fisheries sector can accumulate and use its intangible assets, such as skilled labor, strong managerial entrepreneurship, and employee loyalty and unity, even in the absence of sufficient financial resources and sophisticated technology. Small, incremental advances could lead them to a promising commercial domain in both local and international markets.

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