Evaluation of Status and Competitive Advantage of Tuna Aquaculture in Australia

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1. Introduction

Tuna have been an important food resource for humans since ancient times. While the harvest of wild-caught bluefin has been decreasing, the production of cultured bluefin tuna has been increasing rapidly (Sylvia 2004). Total bluefin production is around 65,000 tonnes a year and, of this, cultured tuna production is now around 30,000 tonnes (Joseph 2003). Given that fisheries regulations to preserve the wild bluefin resource will be strengthened further, it is expected that cultured tuna as a substitute for wild bluefin will become more important in the near future.

Although tuna aquaculture is becoming an important industry, the current situation within each of these producing countries is not clear so far. Australia, Spain and Croatia are now the main competitors in the tuna market and it is expected that the competition among them will become more intense. However, even for Australia, which has been producing cultured tuna, Southern Bluefin Tuna (SBT, Thunnus maccoyii), for over 10 years, the situation of tuna farming industry and the competitive status between producing countries

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has not explored well. Because tuna aquaculture can influence the tuna market, the domestic economy and the environment (aquaculture farming and the wild tuna resource), there is a need to evaluate the present situation, limitations and challenges of the tuna farming industry and measure its competitiveness.

This paper aims to make clear the status of tuna aquaculture industry in Australia. The factors which have facilitated the rapid development of tuna production in Australia, as contributing factors for comparative advantages in domestic economy, are explored through statistical data analysis and interviews with relevant sectors. The competitive forces are evaluated using criteria for competitive advantage indicated by Porter (1985) and used to identify the challenges facing tuna farming in Australia. In terms of forces governing competition in an industry, the model proposed by Porter (1985) suggests five forces composing competitive advantage: the entry of new competitors, the threat of substitutes, the bargaining power of buyers, the bargaining power of suppliers and the rivalry among the existing competitors. This model provides a useful way to evaluate the industry. Statistical data were collected from the publications and the website of the Australian Bureau of Agricultural and Resource Economics (ABARE), the Primary Industries and Resources of South Australia (PIRSA), the South Australian Research & Development Institute (SARDI), the Australian Fisheries Management Authority (AFMA) and the Tuna Boat Owners Association in Australia (TBOA). Then direct interviews with tuna farmers in Port Lincoln in March and June 2004, the president of TBOA in May and June 2004, and staffs of PIRSA and PARDI in December 2003 and May 2004 were done respectively.

2. Tuna aquaculture in Australia

2-1. History

World production of SBT was over 40,000 tonnes annually until the early 1980s and plummeted after 1983 to 15,000 tonnes. This rapid decline facilitated the establishment of fisheries management schemes by the Commission for the Conservation of SBT (CCSBT). The CCSBT has set up Australian TAC for SBT as 5,265 tonnes a year in 1989. Consequently it let the industry prompt the reconstruction of the tuna fishery to value-add (Campbell et al. 2000). Then tuna farming, as a substitute of tuna purse seine and pole and line fishing, was initiated in Port Lincoln, South Australia, associated with the TBOA, the Japanese Overseas Fisheries Cooperation Foundation (JOFCF) and the PIRSA. Experimental farming was carried out in 1991 by the joint venture by TBOA and JOFC off the coast of Port Lincoln. In 1993, the present catch and towing system was developed. Because of extensive damage caused by a cyclone in 1996, the farming site was moved and extended widely by the State Government in 1997.

As the number of companies increased and their farming operations expanded, the production increased rapidly, as illustrated in Figure 1. Until 1996 it increased gradually and since 1997 rapidly. It reached 9,000 tonnes and AU$ 260 million in 2000 and has maintained the 9,000 mark since then. The total economic effect generated by the aquaculture production (AU$ 260.5 million in 2001) is estimated AU$ 491 million (EconSearch Pty Ltd 2003). Then total employment generated by tuna farming is done around 1,800 jobs.

At present, the number of farming companies is 12, most of which are previous tuna fishing companies. The licensed farming sites (1,775 ha in 2003) and the SBT quota (4,752 tonnes in 2004) for farming is divided...
Table 1. Farmed tuna production in South Australia (tonnes)

<table>
<thead>
<tr>
<th>Fishing Year</th>
<th>Total catch by all fisheries</th>
<th>Into Farms whole weight (A)</th>
<th>Aquaculture production (B)</th>
<th>Growth rate (B/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990/91</td>
<td>4,015</td>
<td>17</td>
<td>–</td>
<td>0.0%</td>
</tr>
<tr>
<td>1991/92</td>
<td>4,094</td>
<td>138</td>
<td>97</td>
<td>70.3%</td>
</tr>
<tr>
<td>1992/93</td>
<td>4,562</td>
<td>722</td>
<td>535</td>
<td>74.1%</td>
</tr>
<tr>
<td>1993/94</td>
<td>4,667</td>
<td>1,294</td>
<td>1,275</td>
<td>98.5%</td>
</tr>
<tr>
<td>1994/95</td>
<td>4,430</td>
<td>1,954</td>
<td>1,927</td>
<td>98.6%</td>
</tr>
<tr>
<td>1995/96</td>
<td>5,188</td>
<td>3,362</td>
<td>2,013</td>
<td>59.9%</td>
</tr>
<tr>
<td>1996/97</td>
<td>4,975</td>
<td>2,498</td>
<td>2,547</td>
<td>102.0%</td>
</tr>
<tr>
<td>1997/98</td>
<td>5,210</td>
<td>3,610</td>
<td>5,140</td>
<td>142.4%</td>
</tr>
<tr>
<td>1998/99</td>
<td>5,232</td>
<td>4,991</td>
<td>6,365</td>
<td>127.5%</td>
</tr>
<tr>
<td>1999/2000</td>
<td>5,260</td>
<td>5,133</td>
<td>7,780</td>
<td>151.6%</td>
</tr>
<tr>
<td>2000/01</td>
<td>5,255</td>
<td>5,163</td>
<td>9,051</td>
<td>175.3%</td>
</tr>
<tr>
<td>2001/02</td>
<td>5,263</td>
<td>5,234</td>
<td>9,245</td>
<td>176.6%</td>
</tr>
<tr>
<td>2002/03</td>
<td>5,395</td>
<td>5,370</td>
<td>9,978</td>
<td>185.8%</td>
</tr>
</tbody>
</table>

Source: TBOA and SARDI
Note: Fishing Year is from December to November of the next year.

between them. The largest of these company has a farming area of 400 ha and a quota of around 1,200 tonnes of SBT. However, most companies have a farming area of around 30 ha and a SBT quota of 250 tonnes.

2-2. The tuna aquaculture process

Young tuna of 10 to 15 kg are caught by purse seine net under the Individual Transferable Quota (ITQ) system. Each company has their quota and catch young tuna within their quota. Fish are caught from December to March in the Great Australian Bight, south-west of Port Lincoln. Tuna caught by purse seine net are transferred to a towing cage and towed slowly to the farming site taking 3 to 4 weeks. At the farm site, young tuna are transferred and separated into growing cages with appropriate density; in general 1,500 to 1,700 fish a cage. At the moment, the number and weight of tuna are checked against the allocated quota by a fishery observer authorized by the AFMA.

Tuna transferred into cages are grown for 3 to 6 months until they reach market size and quality, being fed pilchards or mackerel once or twice a day. The main shipping season is from July to October and the fish shipped are 25 to 30 kg each in weight. Table 1 shows the relationship between total catch of SBT, transferred weight and harvested weight. The total catch by all fisheries has been almost equal to the TAC. The proportion of SBT quota transferred into farms has increased and now accounts for most of the quota. Although farming companies had some SBT quota before farming starting, they have required these quotas by obtaining from other fishery. The ratio of harvested weight against transferred weight has been gradually increasing and now stable. This ratio is now around 1.8.

Grown tuna is gradually harvested responding to request by buying companies. Tuna being gathered at a corner of growing cage is picked up by divers, killed immediately on the deck, gilled and gutted and put into ice storage. After harvest, tuna are shipped to the market in frozen or fresh form. Most of frozen tuna and around 90% of fresh tuna are shipped to the Japanese market. In the case of fresh (chilled) tuna, almost 10% is exported to the USA. According to Japanese Import Data, of the total amount (7,518 tonnes) exported from Australia to Japan, 33.1% (2,449 tonnes) is fresh and 66.9% (5,069 tonnes) is frozen, on average over the last 5 years. The exports of frozen tuna appear to be increasing.

3. Characteristics of tuna farming industry

Through the current status of the tuna farming
industry in Australia described above, we can pick up four characteristics of this industry from an economic viewpoint as follows.

Firstly, tuna farming and relative industries are concentrated in Port Lincoln. Originally tuna farming was initiated as an alternative industry for previous tuna fisheries based in Port Lincoln, who had had already favourable conditions to advance tuna farming like tuna quotas and fishing gears to catch wild tuna. Tuna farmers in Port Lincoln have monopolized the SBT quota allocated to Australia, as indicated in Table 1. Such concentration leads the congregation of related industries in Port Lincoln: related fisheries catching wild tuna and feed fish, facilities manufacture, shipping companies, finance industries, R&D institutes and so on. Through this congregation, Port Lincoln has become established as an exclusive producing area and has gained a comparative advantage in the domestic economy (Graham 2003). An industry cluster is thus formed in Port Lincoln.

Secondly, farming procedures are strictly regulated and monitored by Governments. Catching wild tuna for farming is regulated under a scheme of the CCSBT in order to recover the SBT resource. The AFMA, the Australian Federal Government, being charged with this regulation and enforcement, monitors the status of the SBT resource associated with the CCSBT and checks the number and weight of wild tuna caught by each farming company through inspectors authorized by the AFMA. The TAC is allocated originally 4,752 tonnes to farming companies and divided into each company by the TBOA. If each company catches or needs beyond his own quota, it must release the excess catch or rent a quota for it from other fisheries or a next year’s quota. On the other hand, farming methods are also regulated by the South Australia State Government. Farming is licensed by the state government subject to appropriate farming operations like feeding, size of cages and distance between cages, which are set up as license conditions. Farming site is also designated by the state government and each farming company is allocated particular site according to its SBT quota. Particularly, means to reduce an impact to the environment are detailed and monitoring the water condition on the bottom is mandatory for farming companies.

Thirdly, some research and development institutions engaging in tuna farming exist in Port Lincoln and are connecting with tuna industry. Core institutes are the Flinder University and the SARDI. The TBOA also has its own laboratory. The Federal Government has established the Aquafin CRC (Cooperative Research Centre) to joint these institutes under a common project to facilitate research and development concerning tuna farming, funded by the Federal Government, the state government and the industry delegated by the TBOA. These are mainly engaging with improvement of meat quality, development of artificial feeds and protecting the environment. The achievements carried out in these institutes are penetrated to farming companies by the TBOA activities and the CRC seminars or through an experimental farming.

Lastly, destination of shipped tuna cultured in Australia is largely the Japanese market and therefore shipping and exporting of tuna are influenced by marketing strategy of Japanese importers (buying companies). As described already, around 90% of frozen tuna and 95% of fresh tuna exported are bound for the Japanese market, which is regarded as the most lucrative market. Marketing the products to the Japanese market is done through Japanese buying companies. Frozen products are sold to them through buying contracts at set prices and quantities. They are transferred by ship and stocked in freezing storages for marketing control. On the other hand, fresh products are shipped to the Japanese market by airplane on consignment to buying companies. In general, many frozen tuna are marketed with the wholesale market bypassed, and most of the fresh tuna is sold by auction at the wholesale market. Usually farming companies have contracts with some buying companies.

4. Competitive advantage of the Australian tuna farming industry

4-1. The entry of new competitors

There seems to be strong barrier to domestic
competition resulting from the quota and license system and huge initial cost to launch tuna farming. Given the transferability of quota and licence, it is legislatively possible for new entrants to participate this industry. However, because of huge sunk costs, it will be practically difficult for new entrants to establish new farms, particularly in other areas. They will only be able to form a joint venture or M&A of existing companies. For example, one foreign farming company having its origin in North Europe has already entered as a joint venture with a local farming company. The reasons why tuna farms have been formed exclusively in Port Lincoln has become a barrier to tuna farming in other areas. The monopoly situation of producers in Port Lincoln seems to be stable.

The problem is that there is intensive threat of new entry of international competitors, especially from the Mediterranean countries. As indicated in Table 2, the number of producing countries has been expanding and their exports to Japan have been increasing rapidly. Until 1996, producing county was limited to Australia and by 1999 Spain has equalled to Australia. In 2003, the number of producing countries has reached 11 states and the total supplied amount of cultured tuna into Japan accounts for 35,700 tonnes. In addition, it is Northern Bluefin Tuna (NBT), a more preferred commodity in the Japanese market, that is mainly cultivated in these countries. Participation of these countries will cause two problems; one is that increasing supplies of NBT and SBT will reduce Bluefin Tuna's prices as a whole. Another is that cultured NBT could possibly exclude cultured SBT, because of a higher preference for NBT over SBT. These aspects will be examined later.

4.2. Power of suppliers and buyers

Powerful suppliers or buyers exert bargaining power on participants in an industry. In the case of the tuna industry, buyer's power seems to be strong. It is said that the major buying companies in Japan who acquire tunas in producing countries and supply them to the Japanese tuna market comprise mainly 9 companies, consisting of trading companies and specialized tuna buying companies (Demura 2004) and the market seems to be in an oligopsony (Lou 2004). Although tuna farmers in Australia market their products individually, they have to get through these buying companies as a middleman via purchase contract for frozen tuna or consignment contract for fresh tuna because of the complexity of the Japanese tuna market. In addition, such buyers purchase NBT cultured in the Mediterranean countries and also market them to the Japanese market. Consequently, shipping plans (time,

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**Table 2. Changes of supplied quantities of cultured tuna to Japan by countries (tonnes)**

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<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>700</td>
<td>1,500</td>
<td>2,200</td>
<td>2,200</td>
<td>3,500</td>
<td>4,000</td>
<td>6,000</td>
<td>7,000</td>
<td>7,300</td>
<td>7,500</td>
<td>8,000</td>
</tr>
<tr>
<td>Spain</td>
<td>400</td>
<td>1,500</td>
<td>6,300</td>
<td>5,300</td>
<td>7,500</td>
<td>5,450</td>
<td>6,900</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Croatia</td>
<td>600</td>
<td>350</td>
<td>600</td>
<td>1,000</td>
<td>1,300</td>
<td>3,910</td>
<td>3,900</td>
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<td></td>
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<tr>
<td>Mexico</td>
<td>40</td>
<td>130</td>
<td>500</td>
<td>800</td>
<td>500</td>
<td>3,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>100</td>
<td>10</td>
<td>1,900</td>
<td>1,930</td>
<td>3,550</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malta</td>
<td>200</td>
<td>1,000</td>
<td>1,450</td>
<td>1,915</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>1,880</td>
<td>3,250</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Turkey</td>
<td>575</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Libya</td>
<td>370</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cyprus</td>
<td>1,240</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Tunisia</td>
<td>750</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>300</td>
<td>2,500</td>
<td>3,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>700</td>
<td>1,500</td>
<td>2,200</td>
<td>2,200</td>
<td>5,000</td>
<td>6,390</td>
<td>13,530</td>
<td>14,600</td>
<td>20,110</td>
<td>25,120</td>
<td>35,700</td>
</tr>
</tbody>
</table>

Original source: Japan Fisheries Agency
Source: Based on BABA et al. 2004, data in 2002 and 2003 estimated by Yamamoto (2005) was added.
size, number) are mainly decided by the buyers who are well-informed of the market situation in Japan and producing situation in the Mediterranean countries.

In Japan, however, the market situation has been changing and becoming more competitive (Lou 2004). Major factors are increase of cultured tuna, development of super-low temperature container transporting and changes in the distribution channel, especially the distribution associated with supermarkets, which bypass the auction system. Given this situation, it is predicted that the Japanese tuna market will become more dispersed and competitive on the supply side. Farmers will need to rationalise their marketing strategy, coping with buying companies or independently.

In terms of suppliers, fishery catching young tuna and other industries supplying materials to farmers are concentrated in Port Lincoln and many of them are integrated by tuna farming companies. If not, they have close relationship in the tuna industry cluster formed in Port Lincoln. Consequently, bargaining power of most suppliers seems to be negligible. Sole threat is supplying feed fish. Although tuna farming companies involve fishery catching feed fish, they sometimes need to purchase feed fish from foreign countries such as Norway, USA, Japan and so on. At present supply of feed fish is not tight but in the future not sure.

4-3. Substitute products

Strong substitutes threaten competition. At present, cultured NBT in the Mediterranean countries is regarded as a strong substitute for cultured SBT. Originally, the market of cultured SBT was exploited and expanded as a substitute of wild NBT, complementing the decrease of wild NBT. Since the late 1990s, however, cultured NBT also has been provided to the market as a substitute product for wild NBT as well. It means that both cultured SBT and NBT are substitute products of wild NBT and can possibly be competitive. Other tuna species like bigeye and yellowfin are not yet regarded as competitive.

The value of SBT is below NBT. Table 3 illustrates this difference in tuna prices at Tsukiji Market in Tokyo. It is apparent that NBT prices are higher than SBT and fresh tuna prices are higher than frozen tuna. Between NBT and SBT of same category, there is the difference of around 600 Yen/kg (US$5.5, given US$1 = 110 Yen). Furthermore, comparing average prices at Japanese Customs in 2003, NBT imported from Spain is 3,126 Yen/kg (fresh, US$28.4) and 2,933 Yen/kg (frozen, US$26.7), and SBT imported from Australia is 2,297 Yen/kg (fresh, US$20.9) and 2,075 Yen/kg (frozen, US$18.9). In terms of prices, NBT of Spain is around 900 Yen/kg (US$8.2) higher than SBT of Australia. A position as a substitute product of wild NBT appears that NBT of Spain is superior to SBT of Australia.

The shipping schedules of these two cultures tuna are different. Figure 2 shows monthly changes of imported tuna to Japan from Australia and Spain. According to that, it is sure that fresh SBT, frozen SBT and NBT are clearly differentiated by the shipping

Table 3. Dealing amount of NBT and SBT at Tsukiji Market, Tokyo in 2003

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity tonnes</th>
<th>Value Yen million</th>
<th>Price Yen/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic NBT</td>
<td>1,248</td>
<td>4,306</td>
<td>3,450</td>
</tr>
<tr>
<td>Imported NBT</td>
<td>2,100</td>
<td>6,337</td>
<td>3,018</td>
</tr>
<tr>
<td>Domestic SBT</td>
<td>1</td>
<td>2</td>
<td>1,955</td>
</tr>
<tr>
<td>Imported SBT</td>
<td>707</td>
<td>1,755</td>
<td>2,481</td>
</tr>
<tr>
<td>Frozen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NBT</td>
<td>6,588</td>
<td>17,434</td>
<td>2,646</td>
</tr>
<tr>
<td>SBT</td>
<td>9,626</td>
<td>19,368</td>
<td>2,012</td>
</tr>
</tbody>
</table>

Source: Tokyo Central Wholesaler Market Statistics in 2003
season. SBT of Australia are shipped in July to
September (fresh SBT) and in September to October
(frozen SBT). This is because qualities of flesh and
water temperature are suitable for harvesting. On the
other hand, NBT of Spain are mainly imported in
December to March, because of opposite conditions
with Australia and avoiding conflict with Australian
SBT. In terms of the shipping season, at the moment,
competitiveness between these two species seems to
be adjusted and differentiated at the tuna market.

It seems that competition between Mediterranean
and Australian cultured tuna will increase, as an
increase in production in Turkey, Italy and Croatia is
predicted. Their products are mainly NBT and their
size is larger than Australian SBT: Mediterranean tuna
weights are from 50 to 200 kg per fish (Australian tuna
is around 30 kg per fish). Given the competitive
situation with cultured NBT, it is thought that the
competitive position of SBT as a substitute for wild
NBT is vulnerable.

4-3. Rivalry between existing competitors

Given the increase of new entrants in the Mediterra-
nean countries and tuna prices as substitute products
for wild tuna, competition between tuna producers is
becoming intensive and competitive position of the
Australian tuna farming industry seems to be vulnera-
ble. In addition, the Australian have production limit
resulting from the TAC to preserve SBT resource. In
terms of these factors, the Australian farmers have
competitive disadvantage.

However, there seems to be some advantages
compared to the Mediterranean farmers. The one is
flesh quality. High quality is a desirable characteristic
that might differentiate Australian tuna from its
competitors. Quality is determined by not only
freshness, but composition of amino acid and residue of
chemicals. Freshness is affected by quality of feed and
processing and storage condition. Amino acid composi-
tion and residue of chemicals is related to feed and the
environment. It has been found that Australian cultured
tuna have low levels of metal residues (Japanese
 Fisheries Agency 2003). One pillar of tuna research
done in Port Lincoln is improving flesh quality. It
seems to be an Australian advantage that the industry
has strong connection with research institutes.

The second is low farming cost. It is sure that cost
for young tuna which is the major items consisting of
operating costs is lower than that in the Mediterranean
countries where young tuna are bought from different
fishing companies (Yamamoto 2005), because young
tuna are caught by fishing teams of tuna farming
companies in Australia. Moreover, although we can't
accurately compare costs, transportation cost from the
farming site in Australia to the Japanese markets is
surely cheaper than that in the Mediterranean
countries. Other operating cost seems to be similar,
because tuna farming in the Mediterranean countries
has been expanded from Australia originally. Therefore,
total costs in Australia seem to be lower these in the
Mediterranean countries.

The third is proximity to the Japanese market. This
factor results in not only low transportation cost, but
also advantage for quick response on demand in Japan.
As the Japanese tuna market is being segmented into
small dealing unit (for example, tuna shipped on the
market is traded with a couple of fish), farmers need to
supply tuna flexibly. At this point, we can also say the
Australian farmers have advantage.

The problem is that it is difficult for tuna farmers in
Port Lincoln to take strategic actions to differentiate
their products using these advantages. This is because
shipping and marketing plans are almost totally
controlled by the buying companies. Buying companies
deal with a variety of products, including not only
Australian tuna but also tuna from other countries. It
is not in the shipper’s interest to differentiate only
particular products. Even if farmers and researchers
establish the quality advantage, it will be difficult to
obtain a premium price under existing marketing
conditions. If producers can develop the marketing
strategy and establish a traceability system to guaran-
tee product quality, then a premium price may be
achieved.

5. Conclusion

Tuna farming in Australia has developed since 1991
on the basis of on a historical background and geographical advantages. Especially, concentration of SBT catch quota, existence of facilities, knowledge concerning tuna and proximity to the fishing ground gave huge advantages to this industry. These form an intensive producing area by congregating related industries and research institutes in Port Lincoln and constitute an industrial cluster. It results in a comparative advantage in domestic economy. The positioning of Port Lincoln as a monopolistic supplier in Australia is stable.

Meanwhile, there are some disadvantages. As SBT fishing in Australia has been strictly managed under ITQ scheme and almost all TAC are used for fishing young tuna for farming, the TAC may put definitely a production limit of tuna farming. Next, tuna farmers have to depend on Japanese buying companies to ship products to the complicated Japanese market. Therefore, shipping and marketing are virtually controlled by Japanese buyers. Lastly, an increase in cultured NBT in the Mediterranean countries has been making the tuna market more competitive. Prices of cultured SBT in the Japanese market is inferior to cultured NBT. Although Spain NBT and Australian SBT are differentiated by shipping schedules so far, the tuna market will become more competitive as production increases. By such international competition the competitive force of the Australian tuna industry has been eroded. Therefore, it appears that the position of Australian SBT is now vulnerable according to the analytical framework indicated by M. Porter (1985) which we have used in this paper, in spite of the lack of assessing cost performance as an indicator for internal advantage.

Assuming that the production limit and inferior prices will continue into the future, differentiation strategies based on high quality and including reducing costs will be needed. The first item for attention should be feed development, which connects to both cost reduction and flesh quality. Feed is the highest cost element of production and the most important factor affecting amino acid composition. The second is the system to guarantee product quality to retailers and consumers, such as a traceability system and an exchange of information with consumers. The third is a system for related industries in Port Lincoln to share information. At present, such an exchange is done informally and formal exchange is limited to TBOA members. The greatest advantage of the tuna farming industry in Australia appears to be congregation of related industries centring on research institutes in the one place. This complex links all factors of the strategy. How to take advantage of this complex is the critical key to predict the future of tuna farming in Australia.

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