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**Aquaculture export development in Vietnam
and the changing environment :
the case of Pangasius in the Mekong Delta**

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CAS Discussion paper No 59

January 2008

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List of Abbreviations

AFA:	An Giang Fishery Association
AG:	An Giang Province
AGIFISH:	An Giang Fisheries Import and Export Joint Stock Company
BARD:	Bank of Agriculture and Rural Development (provincial)
BSP:	Bank for Social Policy
BTA:	Bilateral Trade Agreement
DANIA:	Danish International Development Agency
DOFI:	Department of Fisheries (provincial)
DONRE:	Department of Natural Resources and Environment (provincial)
EPC:	Export and Processing Company
EU:	European Union
FAO:	Food and Agriculture Organization of the United Nations
FF:	Fish Farmer
GDP:	Gross Domestic Product
IT:	Intermediate Trader
MD:	Mekong Delta
NAFIQAVED:	National Fisheries Quality Assurance and Veterinary Directorate
NTB:	Non Tariff Barriers
PE:	Private Enterprise
PPC:	Provincial People's Committee
SME:	Small and Medium-sized Enterprise
SOE:	State Own Enterprise
SPS:	Sanitary and Phytosanitary Measures
SQF:	Safe Quality Food
TBT:	Technical Barriers to Trade
USA :	United States of America
VASEP:	Vietnam Association of Seafood Exporters and Processors
VND:	Vietnamese Dong
WTO:	World Trade Organization

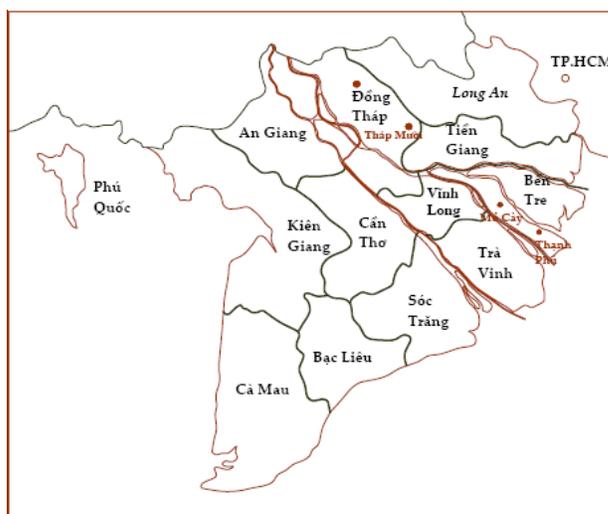
1. Introduction

Since 1986, Vietnam has significantly reformed its centrally planned economy into a market oriented economy through the Doi Moi (renovation) policy. Progress in trade reforms has been rapid. Trade restrictions were gradually removed. In the process of trade liberalization, the government has appreciated increasingly the potential and the value of fishery products. The share of agriculture in Vietnam's Gross Domestic Product (GDP) has reduced gradually, but the same share of fishery increased from 10.25% in 1995 to 12.55% in 2004³.

During the implementation of its policy of economic transition, Vietnam has paid much attention to the re-organization of the rural market. Vietnam's rural area plays a key role in the strategy of economic development, as more than 50% of the exported products have their origins in agriculture and in fishery.

The Mekong Delta (MD) (see figure 1) in the southern part of Vietnam covers 12% of the total area of the country and is a major source of Vietnam's aquaculture production⁴. At present, the MD has about 12,100 fishery farms, accounting for 72% of the whole country. The export value of these fishery farms account for 54.34% of Vietnam's total exports and contributes significantly to rural employments and to the increase in income of more than 6 million people⁵ in the MD. In this process, aquaculture and the exports of the MD are playing an important role.

Figure 1: Map of the Mekong Delta



Note: Provinces farming pangasius: An Giang; Dong Thap; Can Tho; Vinh Long; Tien Giang

The most important freshwater aquaculture product in the MD region in particular, but also in the country, is no doubt the two species of pangasius cultured in Vietnam, namely basa (*Pangasius bocourti*) and tra fish (*Pangasius hypophthalmus*) (see figure 2), showing a very high growth rate both in terms of area and

³ International Monetary Fund 2006, Vietnam: Statistical Appendix – www.imf.org/external/pubs/ft/scr/2006/cr0652.pdf

⁴ Technical note, 2006

⁵ www.quandoinhandan.org.vn/right.php?id_new=65450

production levels. The total production of pangasius in 2006 was about 286.7 thousand tons, 10 times as much as in 2002, and representing approximately 56%⁶ of the total freshwater aquaculture production of the MD.

Figure 2: Species of Pangasius (fresh water fish) in the Mekong Delta



Basa fish (*Pangasius bocourti*)

Tra fish (*Pangasius hypophthalmus*)

Unfortunately, the development of aquaculture is still confronted with many problems. Growth is unstable, and not yet synchronous from the production to the processing phase. Moreover, the existing master plan is unclear, while the access to the export markets is very much hindered by many legislative and technical trade barriers.

The objectives of the present paper are:

- to analyze the renovation process of the Vietnamese fishery policy,
- to evaluate the achievements and challenges of the pangasius industry in Vietnam,
- to present important changes in the markets and the marketing chain,
- to offer findings and conclusions.

2. The process of fishery policy development toward integration

2.1 The fishery policy development process

a. Period 1995 – 2000: Open to the International Trade

In 1995, the USA embargo against Vietnam was lifted and communication between the two countries was normalized. In spite of this bilateral trade between the USA and Vietnam only increased little. In the same year, Vietnam became a member of the Association of Southeast Asian Nations (ASEAN), followed by membership in 1998 of the Asia-Pacific Economic Cooperation (APEC) and in particular, of the Southeast Asian Fishery Development Center (SEAFDEC).

Also during the same period focused much attention was paid to quality management and food security, together with the improvement of the market development strategy, in order to meet the world market demand for the fishery products. As a result, the total quantity of the Vietnam fishery production went up to 2 million tons, equivalent with an export value of 1.48 billions USD in 2000 (Duong, 2005).

⁶ Tran, 2004; and Do, 2005.

The Bilateral Trade Agreement (BTA) between the USA and Vietnam was ratified in July 2000, marking a major step in the normalization process in the relationship between the two countries. The event also gave Vietnam an historic opportunity to expand its export market for fishery products, with the Vietnam Association of Seafood Exporters and Producers (VASEP) is a non-governmental organization, founded on 12 June 1998, based on the principles of volunteerism, autonomy and equality, playing a crucial role. VASEP's members include leading Vietnamese seafood producers, exporters and companies of the seafood sector.

b. Period 2001 – 2006: Trade Dispute and Market Oriented Approach

Between 2001 and 2006 Vietnam experienced dramatic changes in its economy, among which the expanding role of the private sector through the privatization of State Own Enterprises (SOEs). Since 2001, Vietnam's external economic relations also became increasingly complex. Problems extended not only to unsettled trade disputes but also to the government's demands to protect the competitiveness of the Vietnamese products: Pangasius and shrimp products provoked trade disputes between Vietnam and the USA in 2002 and 2004.

The business environment changed dramatically in the period. In the course of 2003, the support of small and medium-sized enterprises (SMEs) was strengthened through the establishment of the Department for SMEs, within the Ministry of Planning and Investment (Leung, 2006)⁷. The same year, Vietnam had 332 seafood processing companies. The product quality improved step by step, due to investment by the companies in advanced technology processing equipment, and to much improved quality management based on international standards. By the end of 2005, 171 Export and Processing Companies (EPCs) were listed as companies allowed to export to the EU market, and 222 EPCs were permitted to export to South Korea. In comparison to the situation before, these dramatic changes were significantly caused by the fact that people are paying much more attention to nutrition, health, safety and hygiene. Also the flu outbreak in 2005 was a key factor changing the consumers' behaviour and preferences.

The changes in the Vietnamese economy experienced an apotheosis when on 7 November 2006 the General Council of the WTO approved the Vietnam's accession package. Vietnam becoming the WTO's 150th member on 11 January 2007, was evidently a golden opportunity for its fishery exports and the processing companies to expand its markets and integrate increasingly into the world market.

2.2 Vietnam's fishery sector and the development process towards the integration

a. What has the Vietnamese Government done to integrate into the world economy?

Between 1995 and 2004, the GDP share of the fishery sector increased from 10.25% to 12.55% (see table 1), which is a remarkable achievement taking into account the gradually reduced share of agriculture in GDP. As indicated above, this went hand in hand with the government's enhanced appreciation of the

⁷ <http://imf.org/external/np/seminars/eng/2006/mekong/sl.pdf>

potential and the value of the fishery sector. As also world demand preferences towards more nutrition and food safety, to which the Vietnamese fishery sector could respond positively, the fishery export value increased substantially (figure 3).

Table 1: Gross Domestic Product of Agriculture, Forestry and Fishery by Sub-Sector at Constant Prices

Year	GDP of agriculture, forestry and fishery (VND billions at 1994* constant prices)				Percentage distribution of agriculture, forestry and fishery at 1994 constant prices (%)			
	Total	Agriculture	Forestry	Fishery	Total	Agriculture	Forestry	Fishery
1995	51319	43658	2399	5262	100.00	85.07	4.67	10.25
1996	53577	45652	2448	5477	100.00	85.21	4.57	10.22
1997	55895	47915	2450	5530	100.00	85.72	4.38	9.89
1998	57866	49639	2459	5768	100.00	85.78	4.25	9.97
1999	60895	52372	2535	5988	100.00	86.00	4.16	9.83
2000	63717	54493	2544	6680	100.00	85.52	3.99	10.48
2001	65618	55613	2556	7449	100.00	84.75	3.90	11.35
2002	68352	57912	2568	7872	100.00	84.73	3.76	11.52
2003	70827	59761	2589	8477	100.00	84.38	3.66	11.97
2004 Est.	73309	61499	2610	9200	100.00	83.89	3.56	12.55

Source: Prof. Nguyen Sinh Cuc 2003 – International Monetary Fund 2006, Vietnam: Statistical Appendix-Web:

www.imf.org/external/pubs/ft/scr/2006/cr0652.pdf

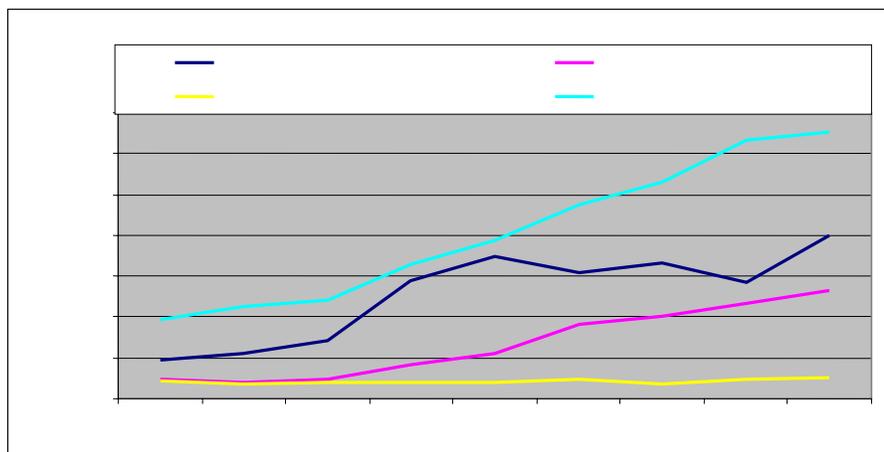
(*) \$1 = 10,966 VND – Web:

<http://www.grips.ac.jp/vietnam/VDFTokyo/Doc/2ndConf15Jul06/1EcoSession1LAMinh2.pdf#search=%22ty%20gia%20hoi%20doai%20nam%201994%22>

In the process implementing its policy of the economic transition, Vietnam paid much attention to the designed economic development strategy and master planning program, which assigns a key role to the rural area as more than 50% of the exported products have their origin in the agriculture and the fishery sector. Consequently, among the main foals of the transition process can be listed:

- To increase the product value harvested, together with the income generated per hectare cultivated.
- To create employment, especially in the rural area.
- To orient market development, thereby strongly linking the rural market and the export market.

Figure 3: Trend of fishery export value 1997-2005



Source: Fisheries Scientific-Technical Economic Information,
<http://www.fistenet.gov.vn/xuat%5Fnhapkhau%5Fe/>

The changes in the structure of Vietnam's agricultural sector have contributed significantly to the increasing export value of fishery products. Government policies focused on the extensive development of fishery in both cultivated area and types of species, together with the open door policy and closer economic relations with the rest of the world. For instance the BTA was an "historical step" in the international relations between the USA and Vietnam since the end of the war in 1975, and, in turn, it brought Vietnam an important step closer to membership of the World Trade Organization (WTO).

During the same period, the Vietnamese fishery industry witnessed a dramatic change in marketing. The "production oriented approach" was very popular in the period 1995–2002 and focused on the production inputs and on the fish farmers (Binh, 2006). The production oriented approach tried to bring farmers in contact with production technology, and with the targets that increased production and decreased prices to attract consumers. In addition, technical information was provided, which required substantial financial support from the public sector and from donors. In contrast, the "market-oriented approach" became popular from 2003 onwards, and concentrated on the outputs and on the needs of the market, also trying to strengthen the commercial linkages between farmers and markets, with production based on market demand and always calling for new skills, and profitability improvement achieved by increasing production and prices.

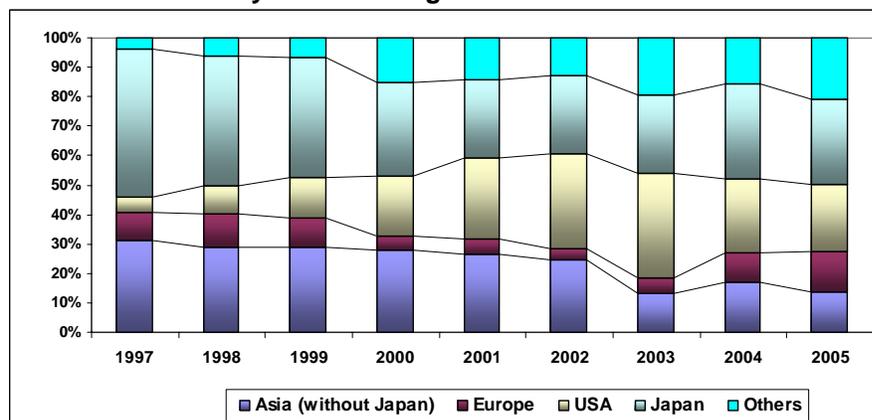
This "market-oriented approach" also took into account the changing Sanitary and the Phytosanitary Measures (SPS) in the foreign markets, with consumption increasingly based on quality and of food safety. Illustratively, in February 2005, the Vietnamese Ministry of Fishery (MOF) issued the Decision No 07/2005/QD-BTS, banning the use of 17 types of chemicals and antibiotics. Of these, 10 types were banned in the EU and 11 in the USA. Another 34 chemicals and antibiotics were banned, including Fluoroquinolones, that were also subjected to limited use in the EU and the USA⁸. In the same year, the

⁸ http://www.mofa.gov.vn/en/tt_baochi/pbnfn/ns050822164653

MOF issued an instruction on strengthening the control of harmful chemicals, which the National Fisheries Quality Assurance and the Veterinary Directorate (NAFIQAVED) directly manage. The MOF was responsible for the control and the supervision of drugs and of the feed stuff production for farming, raising and treating in aquaculture. Control measures were executed in the whole farming process. Samples were taken for antibiotic testing, before harvesting and during the whole process. The products were also under strict supervision before they were sold.

Reforming and implementing new fishery policies have facilitated the export of Vietnamese fishery products to many countries in the world. Target markets are the EU, the USA, and Japan. According to MOF statistics, the export value of the Vietnamese fishery sector increased from \$761 millions in 1997 to \$2.7 billions in 2005, of which Asia had the highest share of 50.3% while the USA had 5.2% in 1997 (figure 4). However, in the period between 2001 and the first six months of 2004, the USA accounted for the highest shares of the Vietnamese export value, implying that the Vietnamese fishery products met the US demand.

Figure 4: The export market share of Vietnamese fishery products by countries/region of destination



Source: Fishery Informatics Centre – MOF, www.fistenet.gov.vn

Following Franses (1998), a regression function $y_t - y_{t-1} = \mu + u_t$ is applied to estimate the export growth rate μ of Vietnamese fishery products, with y_t the logarithm of the fishery export value index in year t, and u_t an unknown residual error time series. Franses' approach endeavours to find out how a market shock (e.g. the trade dispute between Vietnam and the USA) has changed the fishery export trend. The estimation results of the regression function above are shown in Table 2. On a monthly basis, the average export growth rate in value during the period 1997-2005 amounted to 1.4 % per month. During the period 1997-2002, before the catfish war between the USA and Vietnam, this was even 1.8 % per month. In the period after that trade conflict the monthly growth rate of exports became only some 0.7 % (see Table 2).

Table 2: Average monthly growth rates (in value) of Vietnamese fishery exports, 1997-2005

Sample	Estimated average monthly growth rate μ	
1997.1 – 2005.12	1.411	(0.020)
1997.1 – 2002.12	1.780	(0.027)
2003.1 – 2005.12	0.684	(0.027)

Source: Fishery Informatics Center- MOF

Note: The numbers in parentheses are estimated standard errors. All numbers are multiplied by 100

(*): y_t is a logarithm of fishery export index; μ is an unknown parameter; u_t is an unknown residual error time series.

b. Problems of Vietnam's fishery sector with respect to integration in the world economy

World trade in fish and fishery products has grown rapidly over the last two decades, with export values rising from \$15 billion in 1980 to \$56 billion in 2001 (Bostock, Greenhalgh and Kleih, 2004). At the same time, the share of developing countries' has risen from 40% to 50%, and their net receipts have increased from under \$4 billion to almost \$18 billion. Developed countries absorb 80% of world imports, with the USA, the EU and Japan as the dominant markets (Lem, 2003). However, increasingly complex requirements for food safety assurance and traceability set by major markets, particularly in the EU and in North America, have become a threat to existing exporters and a "barrier to entry" for developing countries such as Vietnam. More stringent quality standards are creating a bias in favor of countries with a highly developed infrastructure and of larger suppliers with larger resources.

Confronted with bird flu and illnesses caused by antibiotics, the developed countries have enacted laws and regulations on food safety assurance from the farm to the consumer, and required exporting countries to adopt agreed inspection, examination and certification procedures, thus imposing more restrictive non-tariff barriers (NTB).

The 1995 Uruguay Round Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) and the Agreement on Technical Barriers to Trade (TBT) have given a new direction to international food trade. These agreements are intended to ensure that requirements such as quality, labeling and methods of analysis applied to internationally traded goods, to not mislead the consumer nor to discriminate domestic producers or goods of different origin. The SPS and TBT agreements are thus complementary and mutually reinforcing.

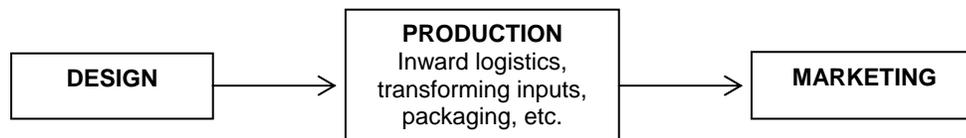
Recent years have witnessed a large increase in policies that could potentially come under the heading of the NTB. Among these are labeling programs and the required tracing capability. The programs are typically found in developed countries and might have a large impact on developing nations like Vietnam. Eco-labeling programs are a means of evaluating the fishery production process with respect to established environmental standards set by an independent third party. If the process meets the standards, the producer or marketer is allowed to buy a license and use a specific eco-label, thus conveying to the consumers information on the product's environmental impact.

No doubt, Vietnam has faced many problems, associated with meeting the SPS and TBT compliance, not only in the fishery sector but also in other export sectors, for many reasons among which: (i) mostly the export and processing companies (EPCs) in the fishery sector are SMEs, of which some show a constraint in processing technology, (ii) additional costs incurred are related to the upgrading for the EPCs, to meet the standards of HACCP⁹, ISO¹⁰, Europe GAP¹¹, etc., in order to obtain licenses for exports to the EU and the USA.

3. Market Chain of Pangasius in the Mekong Delta

The value chain can be described as the range of activities required to bring a product or a service from conception, through the intermediary phases of production to delivery to the final consumers (Kaplinsky, 2004). Considered in its most elementary form, it takes the shape as described in Figure 5, although, in reality, value chains are considerably more extended than this.

Figure 5: A simple value chain



Source: Kaplinsky, 2004

The value chain concept was developed in the 1960s and the 1970s by analysts charting a path of development for mineral-exporting economies (Girvan, 1987), but value chain analysis became popular only during the 1990s, to a large extent as the result of the work of Michael Porter on value chains and the upgrading of national capacities (Porter, 1985). Primary activities are classified into five categories which include inbound logistics; operations; outbound logistics; marketing and service, which the firm marshals to accomplish this task (strategic planning, human resource management, technology development and procurement). (This corresponds to different components of the production link in the value chain sketched out in Figure 3.)

In Figure 6 the value chain before and after the “catfish war” between Vietnam and the USA is depicted and has been developed to support policy decision makers who trigger development, particularly for aquaculture cultivation. Each link of the chain shows central activities and their respective stakeholders

⁹ Hazard Analysis and Critical Control Point (HACCP) is a widely used and internationally recognized science based control system which identifies and evaluates hazards that might occur in the food production process and puts into place stringent actions to reduce hazards from occurring in food production. This system, when properly applied, focuses on preventive measures rather than end product testing. By strictly monitoring and controlling each step of the process, including microbial, chemical, and physical contaminants, the industry can ensure that its products are as safe a science and technology allows.

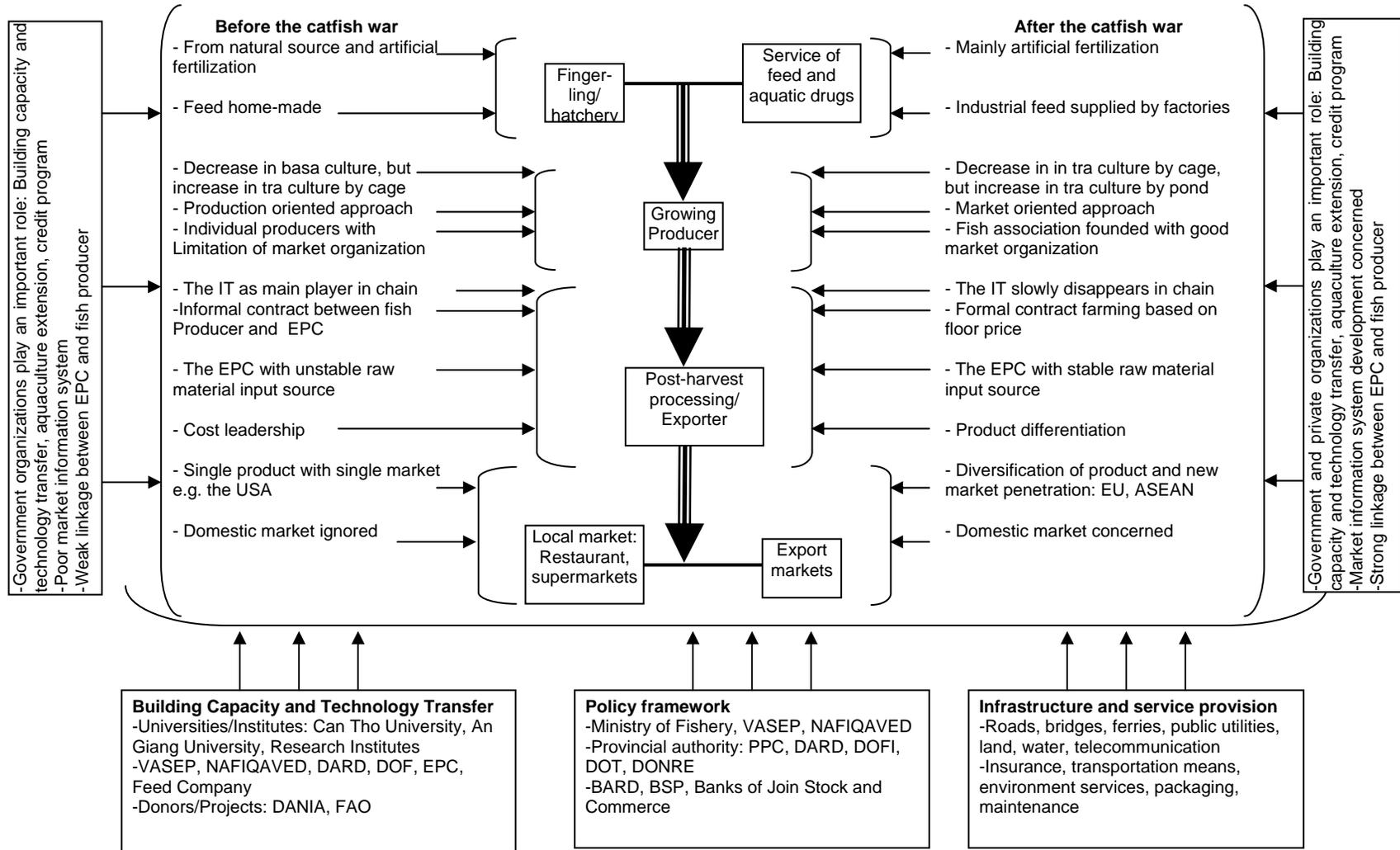
¹⁰ ISO (International Standard Organization) is a global network that identifies what International Standards are required by business, government and society, develops them in partnership with the sectors that will put them to use, adopts them by transparent procedures based on national input and delivers them to be implemented worldwide.

¹¹ The Eurep GAP standards are mandatory standards for any goods going to the main food chains throughout the EU.

who perform these activities. However, the interactions between stakeholders have changed during the catfish war. For instance, before the catfish war, the intermediate trader (IT) was a major player in the market channel to ship the product from the fish producers to the EPC, but his role slowly disappeared to become a broker after the catfish war, with the EPC now directly collecting the product from the fish farmers.

Moreover, before the catfish war, the fish producer usually linked with government organizations through programs of capacity building and technology transfer, but were facing severe limitations in the field of market organization and market information communication. After the catfish war, however, the situation has changed dramatically as the fish producers are not only supported by government organizations, but also by private sector organizations (e.g. private export companies and private feed factories). Since the end of the catfish war, fish farmers are benefiting from various programs, among which credit programs, programs of capacity building, technology transfer, aquaculture extension, market information, etc., whereas on the output side fish farmers' are involved through formal contract farming.

Figure 6: The value chain of pangasius product before and after the catfish war



Fingerling hatchery – Service of feed and general aquatic drug

In 1995, a fingerling socialization program started in the MD. Since then, artificial fingerling technology was transferred to the fish farmers (FF). As a result, the fingerling source became more flexible for the fish raisers, contrary to the previous situation when it depended on a natural source. In the MD, the An Giang province (AG) is one of the tra and the basa farming provinces, leading in modern production and in the application of transferred technology. While the number of fingerling amounted to 54.4 million in 1998, it became 174 million in 2001. Although the quantity of fingerling dropped to 122 million in 2002, due to the catfish war, artificial fertilization still accounted for a high percentage. The share of artificial fingerling represents more than 90% (figure 7), while the natural fingerling disappeared almost completely. This change in technology has changed the Vietnamese pangasius industry dramatically, both supplying an active fingerling source for the FF's demand, and insuring a natural resource and reducing environmental impact as a result of people using their fishing net to catch natural fingerling fish in rivers, not only exhausting the natural resource, but also affecting the water flow and the boat transportation system.

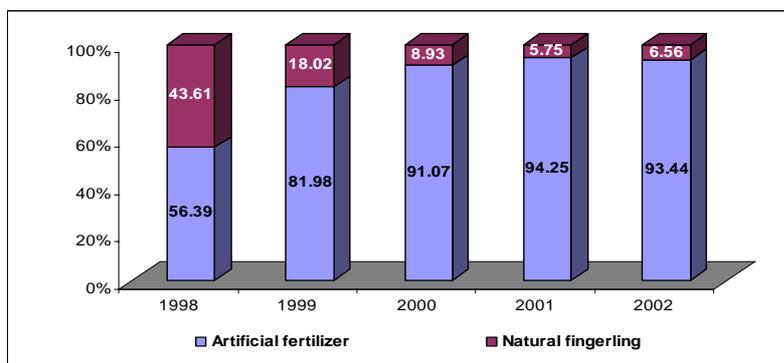


Preparation of baby fingerling in floating seed bags for release into the pond



Releasing fingerling fish slowly

Figure 7: Pangasius fingerling in the An Giang province



Source: Department of Agriculture and Rural Development – Project of Tra and Basa Development of An Giang Province 2003-2005.

Although the state-owned fingerling hatchery centre is playing a key role in the production, the supply and the supervision of the quality of the fingerling quality, the state hatcheries only account for about 15%¹² of the demand of fish fingerling in the AG solely. Private sectors are responsible for the rest. According to a survey on an expert evaluation conducted in the beginning of 2006, the state fingerling centre improved since 2005 the standard quality production process of SQF 1000¹³ to produce high quality fingerlings, and established five satellite branches nearby the FF, to partly meet future demand, both in quantity and the quality. In general, the private sector has still a large market share in the fingerling business. As a result, most fingerlings are produced by the private commercial hatcheries,

¹² Expert evaluation on the centre of hatchery under An Giang Department of Agriculture and Rural Development.

¹³ SQF means Safe Quality Food. The SQF program is a fully integrated food safety and quality management protocol designed specially for the food industry with application at all links in the food supply chain. The SQF 1000 Code is a HACCP based supplier assurance code designed specifically for primary producers.

but there are serious concerns about the viability, the quality and the hygiene status of their stock, which is translated into a lower quality of the finished product. Moreover, many fingerlings have still no clear origin, and are usually sold by mobile fingerling suppliers, who use their own boat transportation, directly transporting to the FF.

Feed is contributing most to the product weight of the pangasius and its share in the production cost more than 70%¹⁴. There are two kinds of feed that the FFs are using. On one hand, home-made feed is popular with the small scale fish farmers, particularly in the period before the catfish war. On the other hand, industrial feed is popular with the large scale fish farmers who are using more advanced production technology, particularly in after the catfish war, due to the growing demand for standardised and high quality feed, and for hygienic safety.



Processing home-made feed



Finished home-made feed

The development of enterprises of fingerling hatchery and the service of feed and general aquatic drugs are much affected by the support policy and by the program of capacity building. The development of pangasius production attracted a growing number of business services, e.g. in input supply services. There are 13 animal feed producers in the south of Vietnam¹⁵, holding the lion's share of the market, among which some big names such as Uni-President (Taiwan), Proconco (France), Cargill (USA), Cataco (Vietnam), Tomboy (France) and CP (Thailand) (see table 3), apart from some 20 to 30 smaller companies. However, Vietnam's total estimated production capacity is about 100,000 tons/year for fish. The 13 large feed companies are expected to produce over 400,000 tons per year. However, supply has not yet fully satisfied the domestic market's demand, and the country has to import some 140,000 – 150,000 tons from Thailand, Hong Kong and Taiwan on an annual basis.

The distribution characteristics of many companies are the same with an extensive network of agents, wholesalers and retailers or farm shops in villages. Besides supply material inputs, farm shops are also important in the provision of informal credit and of technical practice advice.

Table 3: Top fishery feed companies in Vietnam

Company	Estimated Quantity (ton/year)	Starting year of production
1. Cargill (the USA)	25,000, in which 15,000 for fish	1998
2. Proconco (France)	72,000, in which 60,000 for fish	2000
3. CP Thailand	30-40,000	1999 and 2001
4. Uni-President (Taiwan)	70,000, in which 10,000 for fish	2001
5. Tom Boy (France)	30,000	2002
6. Ocialis (France)	30,000, in which 20,000 for fish	2003
7. C J Vina Agri (South Korea)	12000	2003
8. Cataco (Vietnam)	37,000, in which 25,000 for fish	2003 and 2004

Source: www.vietlinh.com.vn.

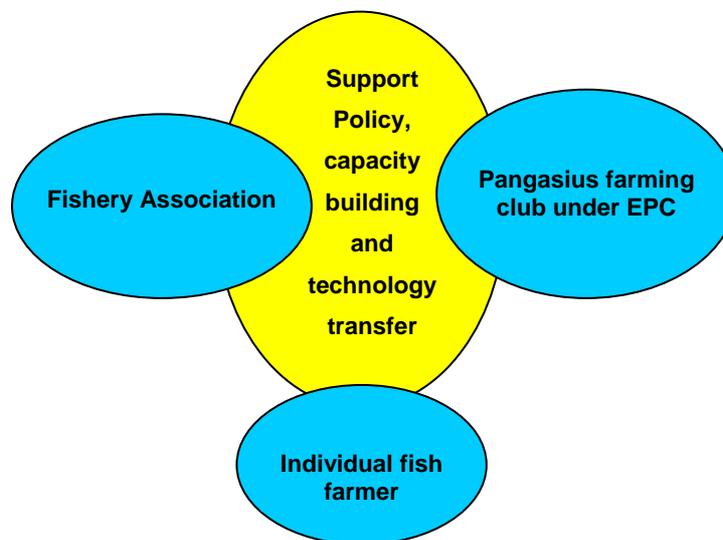
¹⁴ survey in 2003 and 2006.

¹⁵ www.growfish.com.au/content.asp?contentid=2073

Fish farmers (FFs)

The input market and the output market are a constant concern for the FFs. The FF's input comes from the suppliers of fingerling, feed and general aquatic drugs. The FF's output is directly sold to ITs and EPCs. The input and the output markets of the FFs are partly depending on which group the FF joins. As shown in figure 8 three groups of FFs can be distinguished: (1) individual fish raisers, who are not member of any club or association; (2) FF who are member of a fishery association (e.g. the An Giang Fishery Association - AFA); (3) FF who are member of a pangasius club under an EPC. The FF in a pangasius club or a fishery association usually receive more support than the individual fish raisers, which takes the form of extension of aquaculture, transfer of technology, farming credit, contract farming, market information and capacity building .

Figure 8: Fish farmer groups supported by external activities



Business enterprises

Export and processing companies (EPCs): To set up a stable source of raw materials and quality live fish for processing, some EPCs establish their own club, whose members are fish farmers which are carefully selected and bound by a safe fish farming process agreement and a consumption contract. The EPC is responsible for the supply of market information, production technology, feed, general aquatic drugs, while the farming member must sell its output to the EPC under a formal agreement. Taking the AGIFISH companies as representative, its own raw fish source comes from its owned fish club accounting for over 50 percent, whereas previously they had to collect the raw fish input from many different sources. Fish farmers who are not members of clubs or cooperatives, and who do not have a formal relationship with one of the companies, sell to traders who have an arrangement to on-sell to the processing companies.

Other business enterprises: Other businesses are playing a role as distributors who are responsible for supplying input materials or services to the FF. Still others are middlemen who procure the raw fish directly from the FF, then sell to the EPC. Their business profitability depends on the difference between the buying and selling prices. The middlemen are an important part of the pangasius value chain. However, these other businesses are not covered by the present research.

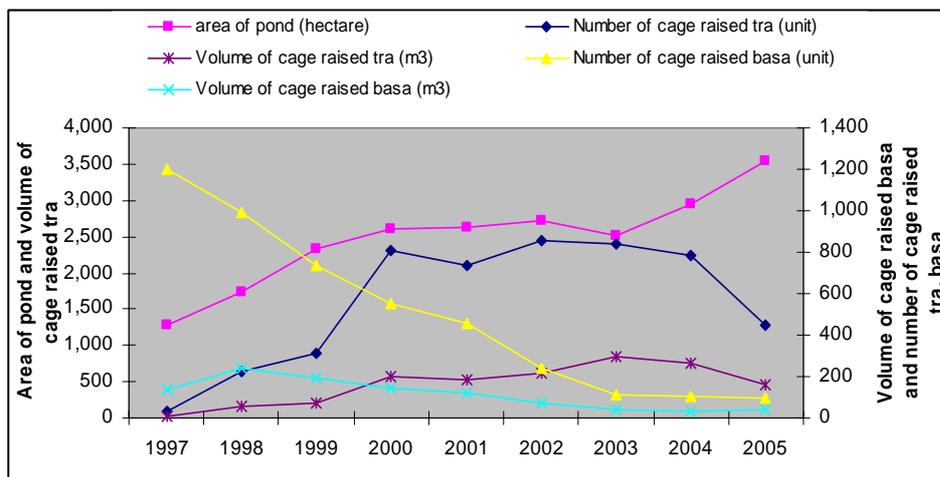
In addition, also stakeholders have very much contributed to the dynamic development in the pangasius market chain, e.g. through aquaculture extension, technology advice, and building capacity.

4. Market and market channel of pangasius

4.1 Growth of the Vietnamese pangasius industry and its challenges

Vietnamese pangasius is a typical fresh water fish with species basa and tra. It is a tasty fish, with a delicate texture and a nice white flesh. The tra fish makes up the bulk of production; it is raised in ponds and in cages, anchored in the MD tributaries. The expansion of markets and demand led to increased development of basa and tra fish farming. As Figure 9 shows there was a substantial increase of catfish production in 2000, as many fish farmers had started catfish culture in cages. However, this quickly reduced after 2004, when the pond areas expanded (for more details on the reasons for this development, we refer to Binh (2006)).

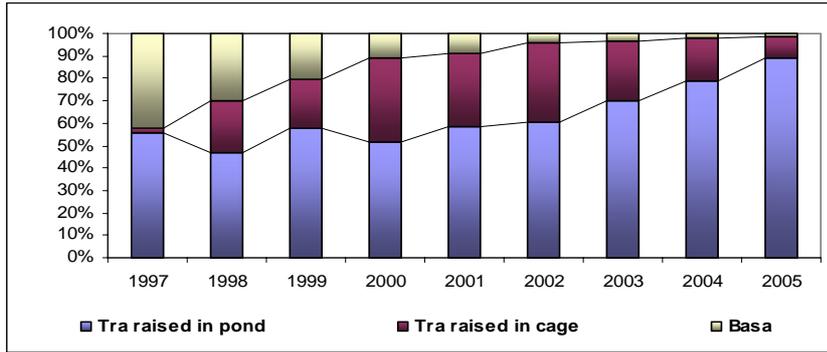
Figure 9: Pond area and cage volume for basa and tra fish production



Source: Provincial Department of fishery in the MD (An Giang, Can Tho, Dong Thap, Tien Giang and Vinh Long province)

Unlike the ecological characteristics of the basa fish, only raised in net cages anchored on rivers, the tra fish has been raised both in ponds and in cages. As Figure 10 clearly shows, the share of the live basa accounted for 42.2% of the total quantity produced in 1997 and fell to 1.29 in 2005, while the share of the pond tra in the total quantity produced was 56% in 1997 and increased to 89.3% in 2002. The increase in the quantity of tra produced and the fall in basa production was caused by tra fish, particularly pond raised tra, becoming more profitable than basa fish.

Figure 10: Share of basa and tra raised in pond and cage (% of total quantity) (1997-2005)



Source: Provincial Department of fishery in the MD (An Giang, Can Tho, Dong Thap, Tien Giang and Vinh Long province)

Figure 11: Pangasius culture in fence and cage



Floating cages anchored on riverbed

Fence close to the bank of river

Figure 12: Pangasius raised below the cage protected by net



Floating cage and pangasius protected by net below

Home made feed

Figure 13: Pangasius cultured in pond

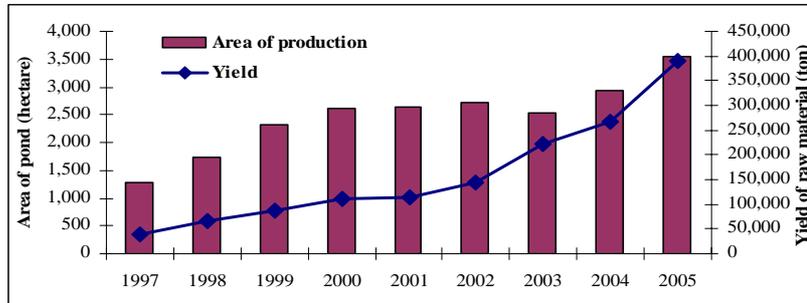


Pangasius cultured in pond

Industrial feed for pangasius

The total production area (pond and fence) of basa and tra fish in the MD has been increasing continuously at an average annual growth rate of 32.8% from 1997 to 2005, in contrast to the average annual growth rate of live fish of 13.5% (see figure 14).

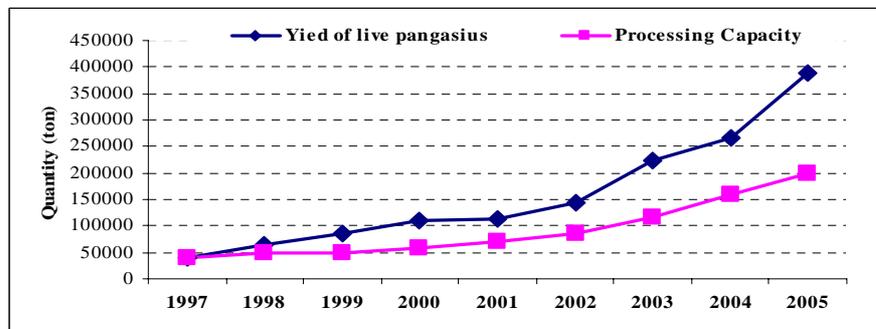
Figure 14: Farming area and yield of pangasius (1997-2005)



Source: Provincial Department of fishery in the MD (An Giang, Can Tho, Dong Thap, Tien Giang and Vinh Long province)

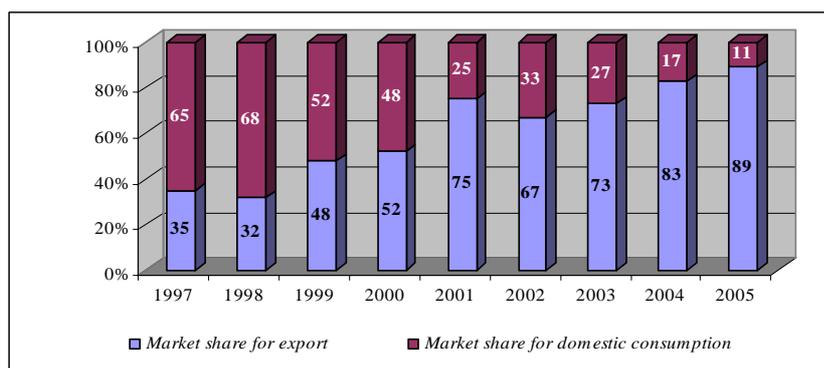
With the growth of the farming area of pangasius, out of line with the companies' processing capacity in the MD, a dramatic lack of balance developed between the supply of raw material fish and the processing demand of fish, particularly between 2003 and 2005 and after the catfish war (see Figure 15). It is true that many processing plants have been established in other regions than the MD, e.g. in Ho Chi Minh City, but the selling price of the FF at the farm gate has not improved much, due to the increased transportation cost.

Figure 15: Live pangasius and processing capacity in the MD (1997-2005)



Source: Provincial Department of fishery in the MD (An Giang, Can Tho, Dong Thap, Tien Giang and Vinh Long province)

The significant growth rate of farm-raised pangasius is very much affected by the expanding export market, as evidenced by Figure 16. The export market accounted for almost 90% of the total quantity of live pangasius in 2005, up from 35% in 1997. The growth in the volume of exports volume has been accompanied by an increasing farming area and raw material of pangasius.

Figure 16: Share (% of quantity) of export and domestic market of pangasius (1997-2005)

Source: Provincial Department of fishery in the MD (An Giang, Can Tho, Dong Thap, Tien Giang and Vinh Long province)

The USA and Chinese catfish are a different species from the Vietnamese pangasius, namely *Pangasius spp.* and *Ictalurus punctatus*. As a result of Vietnam's successes in the USA market and its successful expansion in the EU and in some neighbouring countries' markets, such as China, Thailand and Malaysia, Vietnam's competitors started to produce other catfish species. Prominent is the Chinese catfish.

USA imports of Chinese catfish expanded more than fivefold between 2005 and 2006 and the USA imports of catfish of Thai origin more than twofold (table 4). The main products that are imported into the USA are frozen fillets, of which the Vietnamese frozen pangasius fillet has always been leading from 1999 until 2006. The catfish war between the USA and Vietnam in 2002 caused a cut of total imports of the USA from Vietnam by about half. After 2004, USA imports of frozen Vietnamese pangasius fillets increased again in 2005 and further in 2006.

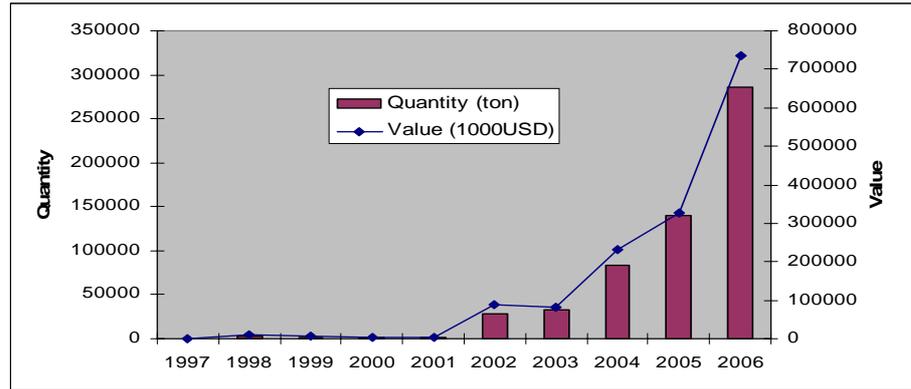
Table 4: US catfish imports by country of origin (in tons), 1999-2006

Country	1999	2000	2001	2002	2003	2004	2005	2006
China	26	86	0	0	326	802	1747	7606
Vietnam	903	3191	7765	4361	1929	2010	8623	17998
Thailand	18	10	46	45	21	2	1493	2415
Malaysia	0	0	0	0	7	0	482	2881
Others	617	450	390	221	179	369	1328	2523
Total	1565	3736	8201	4627	2463	4184	13673	34424

Source: Catfish market report – May 2007, www.globefish.org/index.php?id=3883

Total Vietnamese pangasius exports have increased from 425 tons in 1997 to 27,987 tons in 2002 (before the catfish war). In 2006, this volume jumped to 286,600 tons, equivalent to 736 million USD (figure 18). There is also evidence of an expanding role of pangasius products in international white-fish markets, reflected in the increased penetration of the European retail chains¹⁶. Whereas the USA accounted for more than 50% of Vietnam's pangasius exports before the catfish war, the EU accounts for the greater share of Vietnam's exports of pangasius after the catfish war, particularly in 2006 (table 5).

¹⁶ <http://www.eurofish.dk/indexSub.php?id=3265>

Figure 18: Vietnamese pangasius exports

Source: VASEP and www.fishtenet.gov.vn

As shown table 5, pangasius is sold to more than sixty countries, compared to barely seventeen in 2002, including new markets such as China, Hong Kong, Singapore, Canada, Mexico, Russia, the EU and the East European countries. Clearly, the EU is becoming an “emerging market” for pangasius products, representing 43% of Vietnam’s total export volume (EU-25) in 2006, equivalent to 123 thousand tons (with EU-15 accounting for 33%, equivalent to 96 thousand tons). The next important market is Russia, with 15%, equivalent to 43 thousand tons. This means that Vietnamese exporters very quickly responded to the challenge of the catfish war with the USA and successfully entered new markets. Total pangasius exports to the EU-25 during the first six months of 2007 increased to 48% (increase to 38.5% of exports to EU-15). Some of the reasons that are responsible for the higher growth rates during the recent years are:

- Synergy between the fish farmer and the processing plant based on their agreement on application of SQF 1000¹⁷ by the farmer, and SQF 2000 by the processing plant, with antibiotic residues, e.g. Choloramphenicol, Malachite Green not being allowed in fish products.
- An increase in international demand due to consumers substituting fish for meat meals.
- Processing plants have improved technology to meet hygiene and food safety at a reasonable price, concomitant with diversifying products and expanding market places based on market oriented approach.
- The bird flue outbreak in Asia has driven Europeans to opt for fish rather than for poultry meat.

¹⁷ SQF stands for Safe Quality Food. The SQF Programme is a fully integrated food safety and quality management protocol designed specifically for the food industry with application at all links in the food supply chain.

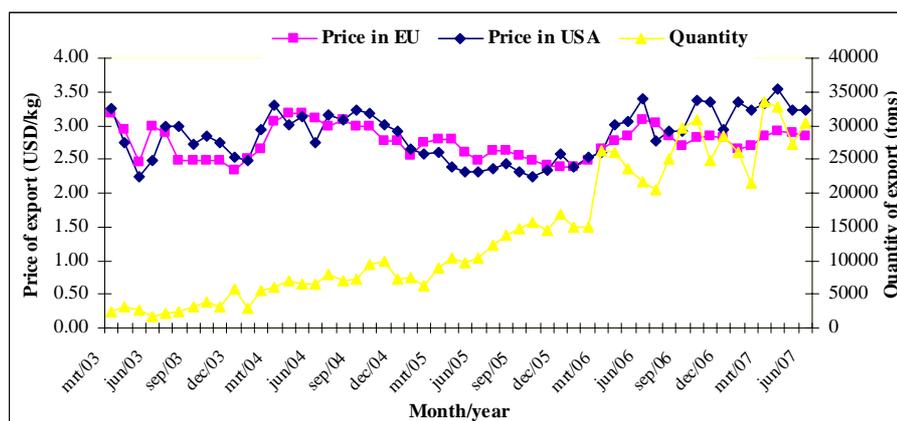
- The SQF 1000 Code is a HACCP (see footnote 13) based supplier assurance code designed specifically for primary producers.
- The SQF 2000 Code is a HACCP supplier assurance code which has wide appeal across the food manufacturing and distribution sectors.

Table 5: Share of Vietnam's pangasius exports by countries of destination (% in quantity), 1999-2007

Country	1999	2002	2003	2004	2005	2006	6months/2007
EU-15	14.73	10.46	20.06	25.71	34.43	33.46	38.49
EU-25	14.73	10.46	20.06	25.71	38.38	42.99	48.00
ASEAN	10.71	8.01	13.50	12.45	15.32	9.95	9.27
USA	43.19	60.50	26.37	17.03	10.27	8.47	4.74
China+HK	19.20	11.35	21.18	21.78	11.38	6.17	5.43
Russia	0.00	0.00	0.00	0.00	2.12	14.93	12.47
Australia	1.40	3.16	6.91	7.55	6.72	3.54	2.53
Others	10.77	6.51	11.99	15.48	15.82	13.95	17.57
Total	100.00						

Source: VASEP and Fisheries Scientific-Technological Economic Information¹⁸

Figure 19 depicts the US dollar price (unit value) for 1 kilogram of pangasius in the USA and in the EU. The price in the two markets remains remarkable parallel between March 2003 and May 2006. Between June 2006 and June 2007, the export price into the USA is higher than the price into the EU, most likely due to trade barriers and anti-dumping duties in the USA.

Figure 19: Price and quantity of export (3/2003-6/2007)

Source: VASEP

4.2 Changes in the market channel before and after the catfish war

After the US embargo was lifted in 1995 and with the Bilateral Trade Agreement of 2001 between the USA and Vietnam, Vietnamese exporters were able to quickly penetrate the USA market. Taking advantage of low production cost (e.g. labour) and cheap fingerling, this was particularly the case between 1997 and 2002 for frozen pangasius fillets.

It will be remembered that technology transfer, aquaculture extension, capacity building, market information, credit support and contract farming are the result of the linkages between the EPC and the FF. However, during the 1997-2002 period no clear linkages existed among the FFs, between the EPC and the FF; and among the EPCs, therefore technology transfer, aquaculture extension, etc. were

¹⁸ www.fistenet.gov.vn

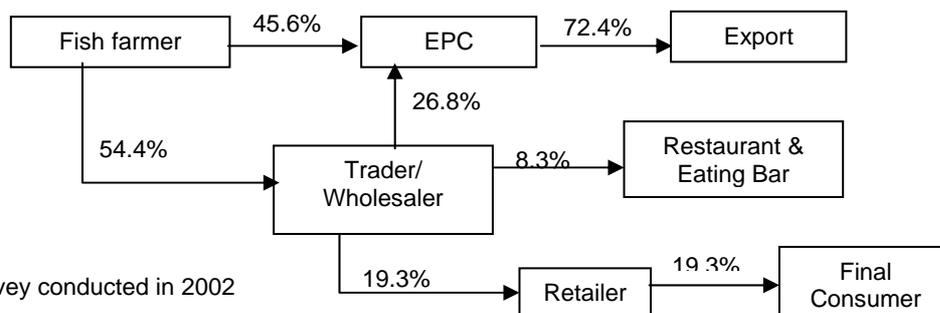
extremely limited. Moreover, EPCs were not cooperating in capturing foreign markets, but in contrast, often were engaged in cut-throat competition.

After the catfish war, however, cooperation between the EPCs improved considerably. VASEP is a successful model to gather exporting members, of which the pricing strategy is much concerned when exporting to the world market, e.g. minimum limitation sets up the price strategy without uniform. Many business promotion programs of the EPCs were set up with the FFs. Initiatives of capacity building, aquaculture extension, credit support, farming clubs, contract farming, modern production and technology transfer were spreading, which made the EPC feel secure that the raw material market would meet the needed quantity for processing. At the same time, production costs could be reduced, together with the traceability process of original product, in line with the international standards and consumer demand.

Market channel description

Before the catfish war, the intermediate trader (IT) was an important link between the FF and the EPC. More than 50% of live pangasius of the FF was directly sold to the IT (see Figure 20). Business functions of the IT were collecting and trading products like a collecting trader. Using its own boat, the IT also shipped the live pangasius product from the farm gate to the processing plants to earn the difference between the purchasing and selling price. This market channel structure is consistent with the initial stage of the Vietnamese pangasius industry development, as the farming scale of the FF was small and production and processing was done at a distant place. The farmers were communicating mostly with the local IT and strongly hesitated to deal directly with the EPC.

Figure 20: The market channel of pangasius before the catfish war



Source: Survey conducted in 2002

Although during this period the collecting function of the IT was required, the FF faced many disadvantages:

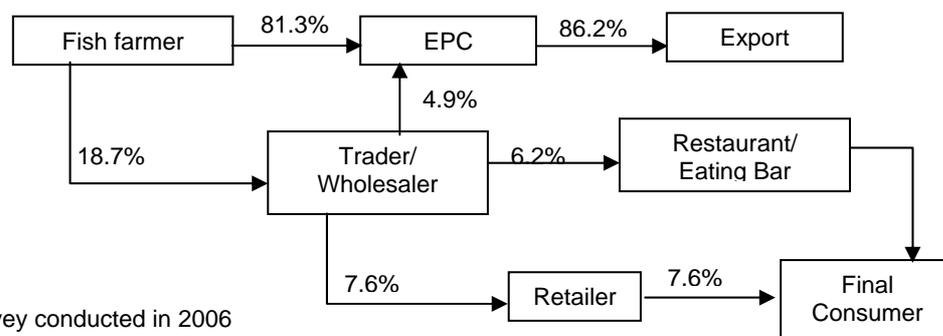
- The FF had few opportunities to look out for external markets, and showed little motivation to improve the fish quality.
- The transfer of farming technology from the EPC to the FF was very small, due to very limited contractual or communication links between the EPC and the FF.
- The risk of price instability was a continuous threat to the FF, depending on the IT rather than on the EPCs.
- The selling price of the FF depends and is usually controlled by the IT who always tries to push the buying price down.

- The IT's financial ability to pay the FF after having purchased the product was often very limited. In addition, payment was often made too late. Some IT tried to extend the payment time to the FF.
- When buying the live fish from the FF, the IT does not have real quality evaluation criteria, and is mostly negatively evaluating the pangasius quality. As a result, the FF loses its benefit when selling its own product, since the selling price is lower than the real value of the pangasius quality.
- The FF's profits went partly to the IT and the IT's share in the gross marketing margin, amounted to 12.12% in the period before the catfish war (compared to 2.9% after the catfish war, see table 6).

After the catfish war the marketing channel picture changed dramatically, not only in the farming technology, but also in the consumption structure. With the spread of market liberalisation, small scale FFs were replaced by large scale FFs with sufficient financial backing. The function and the business role of the IT reduced considerably to slowly disappear in the market channel as a comparison of Figure 20 and Figure 21 shows. After the catfish war 81.3% of live pangasius was directly sold to the EPC and only 18.7% to the IT. These changes also caused more synergy between the FF and the EPC through contract farming. The new market channel structure created the following advantages:

- Production by the FF is market oriented
- Small scale farmers were replaced by large scale farmers who can meet the EPC's contract farming conditions both in terms of quantity and quality.
- Large scale farmers can easily apply the modern farming technology.
- Through direct selling to the EPC, the FF can avoid the IT's price negotiation and quality evaluation about the live fish offered, thereby undermining the bargaining power of the IT and reducing his marketing margin (see Table 6). Consequently the marketing margin of EPC has increased.
- Large scale farming by individual FFs within the same region also brings important external economies of scale, related to collecting the production and to services provided by the local authority (aquaculture extension programs, capacity building policies and environmental management and control).

Figure 21: The market channel of pangasius after the catfish war



Source: Survey conducted in 2006

Table 6: Marketing margin of the economic agents in market channel before and after catfish war

Description	FF	IT	EPC	REB	R
Distribution rate of marketing margin <i>before</i> catfish war (%)		12.12	60.70	21.60	5.58
Distribution rate of marketing margin <i>after</i> catfish war (%)		2.9	81.88	12.89	2.33

Source: Survey conducted in 2003 and 2006, FF = fish farmer; IT = intermediate trader; EPC = export processing Company; REB = Restaurant/eating bar; R =Retailer

After the catfish war the Vietnamese pangasius industry received lessons and experience. Reorganization from the farming level to the consumption market was quickly and synchronously implemented. In addition, by adjusting the pangasius supply at the farm gate and by diversifying into higher value-added products, while the EPC expanded sales into new export markets, e.g. the EU and the ASEAN market, reduced the huge dependence on the USA market. As a result, one year after the outbreak of the trade dispute with the USA, the Vietnamese pangasius industry had recovered.

Production cost description

As mentioned above, the three most important components of the production cost of basa and tra are feed, fingerling fish and general aquatic drugs. As a result of the catfish war, the production cost of tra cultured in cage and in pond changed in an important way, both in value terms as in composition. This is clearly evidenced in Table 7. Reasons for these changes are as follows:

- The FF is using more industrial feed which increases the weight and the quality of pangasius¹⁹.
- The price of industrial feed has increased, as the demand of farming feed exceeded the production of the livestock feed companies.
- An increase in the fingerling price due to higher farming demand, together with increased fingerling quality was increasing, while the original supply was still limited as well.
- At present, many farmers are entering the pangasius market and start production. Consequently there is an increase in the demand for feed, fingerling, general aquatic drugs and labour, which in turn leads to higher prices of these inputs.

Table 7: Structure of production cost of raw material

Description	Before the catfish war		After the catfish war	
	Value (VND/kg)	Percent (%)	Value (VND/kg)	Percent (%)
Tra cultured in cage				
Feed	5958.19	69.33	8441.00	73.75
Fingerling	1386.39	16.13	1892.00	16.53
General aquatic drug	295.22	3.44	429.00	3.75
Interest bank	270.89	3.15	136.00	1.19
Labour	227.15	2.64	335.00	2.93
Preparation and depreciation	288.54	3.36	107.00	0.93
Fuel and electricity	118.75	1.38	74.00	0.65
Others	49.15	0.57	31.00	0.27
Total	8594.28	100	11445	100
Tra cultured in pond				
Feed	5304.41	73.81	7921.50	78.77
Fingerling	849.31	11.82	986.00	9.81
General aquatic drug	256.51	3.57	425.50	4.23
Interest bank	208.52	2.90	151.50	1.51
Labour	292.71	4.07	231.00	2.30
Preparation and depreciation	17.16	0.24	75.00	0.75
Fuel and electricity	204.45	2.84	155.50	1.55
Others	53.92	0.75	110.00	1.09
Total	7186.99	100	10056	100

Source: Survey conducted in 2003 and 2006

Other costs: business registration tax, marketing

1 USD = 15450 VND (2003); 1 USD = 15972 VND (2006)

5. Conclusion

The successful economic transition of Vietnam has been an important step in opening up vis-a-vis the world economy. In this paper we have studied the case of the Vietnamese pangasius industry and how it was transformed due to external changes in the environment, among which the catfish trade dispute with the USA.

Although the Vietnamese pangasius industry is young and facing many problems, e.g. technical barriers to trade and trade disputes, its development has changed in a spectacular way from the "production oriented approach" to the "market oriented approach". The FF have become very much aware of the important investment to reach food hygiene and safety.

It was shown in this paper that the various stakeholders in the market value chain of pangasius in the MD, reacting to the changing external environment, were able to improve their business by enhancing their competitive power and cooperating against the many technical and other barriers to trade in the world market.

The synergy which developed between the FF and the EPC as a result of the trade dispute with the USA, has brought about additional benefits after the catfish war. However, in spite of the FF applying modern technology, which improved the product quality of the pangasius and reduced the production costs, the input prices (basically feed, fingerling and aquatic drugs) have increased dramatically.

Confronted with these new developments, there is an urgent need for policy makers at the national and regional level in Vietnam to dispose of a thorough policy framework analysis on the pangasius industry so that the necessary practical policy responses can be designed and implemented for a sustainable development of the pangasius industry in Vietnam.

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