

STRATEGY FOR THE EXPORT OF TILAPIA IN CUBA

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ABSTRACT

This paper analyses the commercialisation of tilapia, allowing the export market of Cuban tilapia to optimise its income and to increase the value of the production in the next four years, distinguishing the specific requirements of each market. The wide segmentation that currently exists in the market will vary with the growth of production and consumption and price tendencies will correspond with it.

Tilapia has been catalogued as the fish of the new millennium. Observers of this industry assert that originated products of this species will conduct the white fillet in the United States (US) market. The forecasted fillet import will grow at an unprecedented rate. American companies are in the process of expansion, in volume and quality of the product.

If it is considered important to penetrate the US market, it is important to understand the difference between the different fresh and frozen product presentations that are available. Cuba will have to take advantage of its favourable geographic location, consumption growth and the volume of sales.

Current trends in the US tilapia market indicate that Southeast Asia and the American countries are primary suppliers. On the other hand, there is also growing interest in the European market, as shown due to increased consumption.

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1 INTRODUCTION

Tilapia (*Oreochromis niloticus*, *Oreochromis mossambica*) is native to Africa, but has been introduced in many countries around the world. Tilapia is disease-resistant, reproduces easily, eats a wide variety of foods and tolerates poor water quality with low dissolved oxygen levels. Most will grow in brackish water and some will adapt to full strength seawater. These characteristics make tilapia suitable for culture in most developing countries (ATA 1998).

In recent years, the increase in world production has been fuelled by an expansion in aquaculture. Between 1980 and 2000, the contribution of cultured tilapia production increased from 108,536 tonnes (29% of the total harvest) to 1.3 million tonnes (68% of the total harvest) (Seafood International 2002).

Once considered a lowly, muddy-tasting fish grown in third world countries, tilapia is now farmed in dozens of countries (in ponds, tanks and cages) and subjected to rigid quality-control standards. Tilapia is a fish that combines a mild, consumer-friendly flavour with a hint of exotic appeal. United States (US) consumption of tilapia is now higher than that of trout (Pacific Seafood 2002).

Tilapia has, in recent years, gained a wider consumer acceptance. Commercial production has become popular in many countries around the world and the traditional markets of Asia and Africa have expanded to many countries in the Americas and Europe. Because of its dynamic expansion, strong marketing efforts, and increasing popularity, farmed tilapia is fast becoming a significant substitute for traditional whitefish species.

In 1996 over 800 thousand tonnes of tilapia were cultured worldwide, and this figure has grown to almost 1.3 million in 2000 (Seafood International 2002). Worldwide, tilapia aquaculture has grown impressively during the 1990s, and forecasts indicate that the industry will continue to expand considerably in years to come (Alceste and Jory 2001).

Geographically, aquaculture in Cuba benefits from good natural conditions with thousands of square kilometres of water surface as well as by optimum temperature, salinity, physical, chemical and biological conditions. The tilapia culture represents 50% of the aquaculture production of the country and the estimated cost of production is \$1.30/kg (INDIPES 2001). The tilapia industry has grown fast in recent years in response to increase demand in the domestic market. Exports from Cuba declined from 1996-1998, but have been growing since 1999.

According to the master plan for Cuban fisheries (INDIPES 2002), Cuba intends to increase production of tilapia from 2,500 tonnes in 2002 to 9,500 tonnes in 2005.

Meanwhile, tilapia is the third most imported aquaculture product into the US market and will most likely increase in the future. The total US imports from 1995 to 2001 were 56,300 tonnes (Lem 2001). Tilapia prices are expected to decrease in the long-term and this should lead to greater imports to the US as well as to Europe, which presently is undeveloped as a market for tilapia (Lem 2001).

The increased production of tilapia in Cuba and increased import to US markets with the decrease in market price, allows us evaluate possible strategies to establish Cuban tilapia in the US and European markets. This project is a contribution to the economic development of the country.

The main objective of the project is to explore marketing of Cuban tilapia in the US and European markets.

In order to reach this objective; answers to the following questions are presented:

- ✓ What are the main market trends?
- ✓ How is the market price behaving?
- ✓ Who are Cuba's major competitors?
- ✓ What are the main threats and opportunities associated with the market trends?

In the next section, an overview of tilapia markets is provided. After a description of the methods used in this project, the results are presented in five parts (sections 4.1 to 4.5).

The first part describes the development of tilapia production, where global analyses of the aquaculture production, imports of the product, as well as outlook for supplies are provided. Essential aspects are approached in part two about the situation analysis of main markets such as: characterisation, consumption and price tendency. The third part analyses the Cuban tilapia industry with its potential for the next four years, distribution system and export trend. SWOT analysis is the next part and the fifth corresponds to Market Strategy of Cuba, with an emphasis on the 4 P's of the marketing mix. Finally the conclusions and recommendations are suggested to enhance the marketing of Cuban tilapia.

1.1 Background of Cuba

1.1.1 Country profile

The Republic of Cuba is an archipelago formed by the Island of Cuba, the Island of Youth and 1,600 islets. It is located in the Caribbean Sea at the entrance of the Gulf of Mexico and constitutes the most western portion of the Greater Antilles. It is situated between 20° 12' and 23° 17' north latitude and 74° 07' and 84° 57' west longitude. The total surface area is 110 860 km² (Figure 1). The country has a population of 11 million with an annual growth rate of 0.35%. Cuba has a coastline of 3,735 km and a tropical climate, with a dry season from November to April and a rainy season from May to October. Arable land is 33%, 8% permanent crops, and 59% other. The GDP is \$25.5 billion with an estimated annual growth rate of 3% (Factbook 2002).



Figure 1: Map of the Republic of Cuba (Encyclopaedia Britannica, Inc 1998)

There are 14 provinces and one special municipality. Latin American countries, in general, have a low population density resulting in low pressure on land animals as a source of animal protein, which has led to a traditional preference for meat over fish. In Cuba, however, fish has always been an important component of the diet and accounts for 40% of the total animal protein intake (Sugunan 1997). Estimated per capita consumption of fish since 2000 is 11.4 kg per year, two-quarters of which is freshwater fish.

1.1.2 Fishery resources

Cuba has rich aquatic resources such as long coastlines, coral reefs, swamps, small river systems and a number of man-made lakes, which are suitable for fisheries development. The goals of fishery development include coastal and deep-sea fishing, freshwater and brackish water aquaculture, mari-culture, and the culture-based fisheries of reservoirs. At present, coastal fishing and culture-based fisheries in reservoirs contribute substantially to fish production (Sugunan 1997).

Three categories of aquaculture systems are practised in Cuba: Extensive, semi-intensive and intensive systems.

- ✓ Extensive system: The fish is cultured in reservoirs >500 ha in size, where natural food is available in the water.
- ✓ Semi-intensive: The fish is cultured in reservoirs in the size range of 10-500 ha, where the natural food in the water is enhanced by the application of organic and inorganic fertilizers, enabling the water bodies to sustain higher population densities.

- ✓ Intensive: Fish culture practised in water bodies up to 10 ha in size and in cages installed in reservoirs. In both cases, the fish are fed with commercial feeds to facilitate higher stocking densities.

All the fishing units are state owned. Regulations on mesh size, number of units and closed seasons are easily implemented. The stocking requirements of the reservoirs are well provided by a network of seed production units in the country.

1.1.3 Production conditions in Cuba

Tilapia has been cultured in Cuba since 1965. Its development has been enhanced because supply of traditional ocean fish is declining by over-fishing in Cuba (Baisre 2000). Furthermore, the demand for high-quality seafood is increasing because of population growth and health-related considerations.

The culture of tilapia is valuable for export and provides a stable supply to the domestic market. The extensive culture has been developed in all provinces of the country (total of 137.5 ha) and the intensive one in the eastern region of the country (Santiago of Cuba), occupying 634,000 ha (INDIPES 2001). There are modern hatcheries that provide potential for growth of tilapia culture. Hatcheries are situated in all provinces that provide millions of fingerlings for growing in dams as well as a rigorous technical control of diseases. Neither chemicals nor pharmaceuticals are used.

2 OVERVIEW OF TILAPIA MARKETS AND MARKETING

2.1 Tilapia markets

The main markets for tilapia have traditionally been within the producing countries. Today the most important market for tilapia is China. However in China tilapia is consumed in a traditional form as live/fresh whole tilapia. It is worth noting, however, that China is now supplying more tilapia to the US market than any other country. In 2000 China exported almost 11,000 tonnes of round (whole) fresh and frozen tilapia to the US, compared with less than 5,000 tonnes in 1999 (Seafood International 2002).

In recent years, tilapia has developed as a competitor to traditional whitefish species and many producing countries now export a considerable proportion of their production. China has quickly become a major supplier to the international market. This could increase the trade of tilapia, but it may also pose a threat to other producers because China can maintain low production costs and may therefore be expected to undercut the price of other producers (Seafood International 2002).

The main emerging market for tilapia is the US, but there is also growing interest in Europe.

2.2 Marketing of tilapia in the US

Tilapia has been called the "Fish of the 90's" by seafood writers in the US. This has been reflected in the rapid increase in consumption in America. No records of consumption were determined before 1992, when imports of tilapia were first reported as a separate commodity. Tilapia is currently the second most important species in aquaculture worldwide and the third most imported aquaculture product into the US, after shrimp and salmon (Fitzsimmons 2000).

As the total seafood demand increases, and wild catch has reached maximum sustainable yield, aquaculture products have fulfilled the demand (Fitzsimmons 2000). As high quality tilapia products began to appear, its recognition has increased in the US

Taiwan continues to be the single largest exporter to the U.S, supplying over 50% of all tilapia products. Mainland China, Thailand and Indonesia are also large exporters to the US (Fitzsimmons 2000). Many tilapia producers have begun processing in their home countries, exporting fillets. So far, most fillets from Asia have been supplied frozen, while products from Ecuador and Costa Rica have been sold fresh.

Tilapia is sold in different forms on the US market; the live market represents the largest outlet for domestic producers. About 70% of the US domestic production is sold live to Asian ethnic groups, particularly in large cities such as New York, San Francisco, Los Angeles and Seattle (Seafood International 2002). Fresh fillets usually go to the retail sector, whilst frozen fillets go to the food service segment.

2.3 The European market

Tilapia is not identified as a separate item in national or EU statistics, but is included under other freshwater species (Seafood International 2002, p.17). Nearly all tilapia marketed in Europe is imported, as European production is very low. Up until five years ago only Belgium farmed tilapia, but now the UK and France have also started production. Germany, Norway and Denmark are also experimenting with farming tilapia.

The consumption of aquaculture products in European countries reflected a wide range of socio-cultural factors, which have shaped the historical evolution of regional and national diets. The pattern of consumption of farmed products hitherto has been heavily influenced by the comparatively recent introduction of many of the products available. In most cases these have been marketed to appeal to the higher priced niche markets in order to increase returns to the producers (Young 1996).

Consistent with this target market, the products have emphasised the whole fish product concept rather than being based upon transformations of the raw material. The diversity of forces within these markets suggests that aquaculture products must increasingly incorporate the product concepts of added value and deliver these through changing channel structures, especially supermarkets (Young 1996).

2.4 Tilapia products

As high quality tilapia products began to appear, its recognition as a quality seafood product has increased in the US (Fitzsimmons 2000). Tilapia has only recently become an internationally traded species. It was previously sold mostly as a low cost domestic product in producing countries. Now tilapia is increasingly seen as a substitute for traditional whitefish species, especially in the fillet market (Seafood International 2002).

There are various indications that tilapia will surpass other species in importance (Fitzsimmons 2000). For example:

- ✓ Production constraints are being reduced, and cost is decreasing.
- ✓ Markets are still expanding.
- ✓ Market prices are holding.
- ✓ Increased training and experience of growers, processors and marketers.
- ✓ It is ecologically sustainable.
- ✓ It is popular among environmentalists.
- ✓ Many consumers prefer the mild flavour.
- ✓ Carp markets are limited.
- ✓ Salmon and shrimp need high levels of feeds.

Tilapia is being sold mainly as: fillets, whole and portions. The fillets can be presented chilled, fresh and frozen skinless and boneless. Whole tilapia is produced fresh and frozen and will be positioned as a substitute for other whitefish species in the market. Dependability of supply, quality and price will be the major determinants of success (Seafood International 2002) and portion as pieces of fish cut from whole fresh fillets (except for the tail).

3 METHODS

A marketing research project normally includes the following steps: Formulating the problem, determining the research design, designing data collection methods and forms, designing the sample and collecting the data, analysing and interpreting the data and preparing the research report (Churchill and Iacobucci 2002).

For this study secondary data and applied information from the internet and other relevant sources were collected. In particular, data on country profiles and international markets were extracted from special databases.

The research questions analysed, were related to the identification and evaluation of potential foreign business opportunities. Aspects such as the current situation worldwide, target markets and consumption, market trends, price, positioning and new processing technology developments (value-added products) were analysed.

Market information on consumption, production, trade structure and prices was collected. The data on a market survey conducted in March 2001 and profiles of the European markets for fishery products were obtained from databases.

Similar data for the US market was collected from official databases, such as GLOBEFISH and National Marine Fisheries Service and surveys that were conducted by the Research Service of the US Department of Agriculture.

The selection of statistical information from the databases on the internet and the literature, made it possible to evaluate trends in the market by using tables and simple graphical analysis. SWOT analysis was also utilised as a qualitative method.

Diagnosis of the marketing phenomena was conducted using SWOT analysis. Opportunities can be seen as those developments in the market or the external environment in which the firm enjoys competitive advantage while threats are those developments which lead to the weakening of the firm's market position if not countered. Opportunities can be assessed according to their attractiveness and the organisations probability of success in this area. Threats can be assessed on the basis of their seriousness and the probability of their occurrence (Wilson and Gilligan 1997).

The results were analysed in relation to the specific behaviour of the tilapia market, establishing the structural analysis.

4 RESULTS

4.1 Tilapia production

4.1.1 Global aquaculture production of tilapia

Global production of tilapia has increased steadily during the past 15 years (Figure 2). Total world production from both wild capture and aquaculture increased from 373 tonnes in 1980 to 1.85 million tonnes in 2000 (Seafood International 2002).

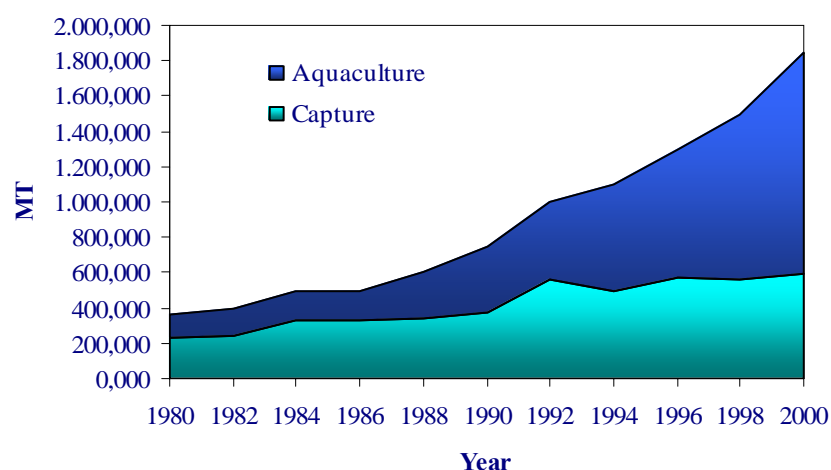


Figure 2: World tilapia production 1980-2000 (Seafood International 2002).

The observed increase in recent years has been caused by an expansion in aquaculture, while capture of tilapia has stayed relatively stable over the years. Nile tilapia (*O. niloticus*) and Mozambique tilapia (*O. Mossambica*) have dominated the production in recent years. Global production has been greatly influenced by the rapid

expansion of culture of both species in China, the Philippines, Thailand, Indonesia and Egypt.

In China, production of tilapia increased from 119,800 tonnes in 1991 to 629,200 tonnes in 2000 (Figure 3). This has resulted in China accounting for 50% of the total global tilapia culture (Seafood International 2002). Other large producers included Thailand, the Philippines, Indonesia and Taiwan.

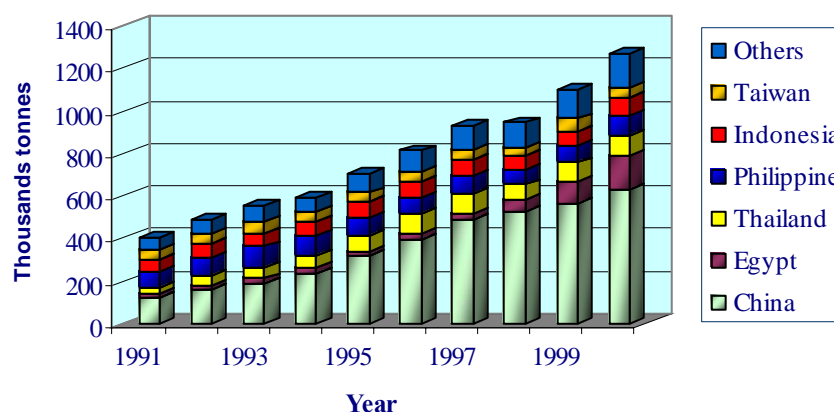


Figure 3: World tilapia aquaculture by country (based on information from FAO 2000).

Asia is the main region where tilapia is now produced and is also mainly responsible for the growth experienced during the past decade. Asian countries are by far the main suppliers to the US, together accounting for 82% of tilapia imports in 2000. However, Africa and South America have also experienced a substantial increase in their tilapia output during the past decade (Josupeit 2001).

Tilapia production is expected to increase significantly in Asia, Latin America and Africa during the next five years, due to several large tilapia farms that are currently being developed and more investment is expected in this field in the future (Seafood International 2002).

Tilapia is now produced in virtually every country in the Americas. The market for tilapia has grown even more quickly. The US alone imported 30,559 tonnes of tilapia products representing 72,428 tonnes of live weight fish in 2000 (Fitzsimmons 2000).

The major tilapia producers in the Americas in 2000 were, Brazil (28,819 tonnes), Colombia (22,870 tonnes), Ecuador (9,201 tonnes), Costa Rica (8,100 tonnes), Mexico (6,726 tonnes), and Jamaica (4,500 tonnes) (Varadi *et al.* 2000).

Brazil used the greatest variety of production systems. In Mexico and Cuba, stocking and harvesting from reservoirs is the major source of tilapia. Poly-culture with shrimp is another current trend. Ecuador is also integrating tilapia culture into their shrimp industry that has been devastated by viral diseases. Honduras is increasing production rapidly with a mix of cage culture, intensive ponds and integration with shrimp farming. Costa Rica, Colombia and Jamaica have developed intensive pond culture systems with a mix of high flow rates and paddlewheel aerators (Fitzsimmons 2000).

Brazil will probably become the biggest tilapia producer in the Americas within the next 20 years. It has tremendous warm water resources, a large domestic market and relative proximity to US and European markets (Fitzsimmons 2000).

4.1.2 Global analysis of imports

On a live weight basis, tilapia is now the third largest imported aquaculture product entering the US. The import of tilapia into the US began on a commercial scale in 1992. Since 1993, the tilapia industry in the US has grown considerably, both in terms of volume and value of the imports (Figure 4). By 1994, Taiwan had gained controlling interest over the frozen fillet market, accounting for 66% of all frozen fillets entering the US. A new trend towards imported fresh fillets has begun as consumers recognise the value of tilapia and are willing to pay higher prices for a quality product (AquaSol, Inc. 2002).

In 2000 imports of tilapia and tilapia fillets reached 40,497 tonnes, 8% higher than the previous year (USDA 2001). Tilapia imports to the US reached 56,296 tonnes in 2001, up 39% or almost 15,890 tonnes. The increase in imports was observed in all of the product categories (USDA 2002a).

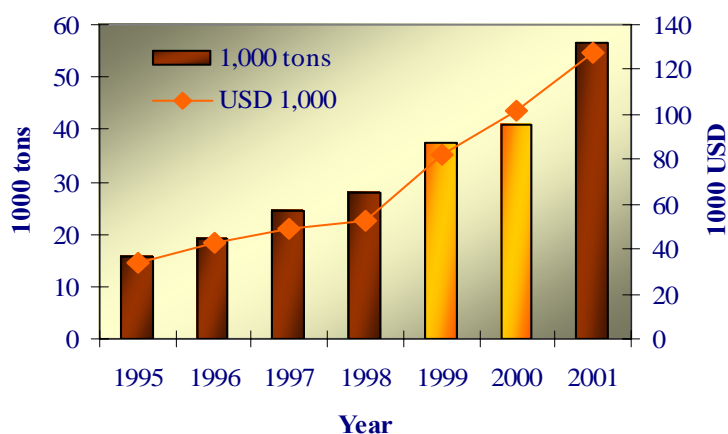


Figure 4: US tilapia imports, volume and value 1995-2001 (based on information from National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002)

California is the most frequent route used by Asian countries for their tilapia exports to the US. Los Angeles and San Francisco are cities with large Asian populations, which are great consumers of this fish. Latin American tilapia producers mainly import their tilapia products through Florida, specifically through Miami (Alceste 1998).

Currently, the leading suppliers of tilapia to the US are Taiwan, Costa Rica, Thailand, Indonesia and Ecuador. Ecuador is now the major exporter of the Americas and significantly increased its tilapia exports to the US in 2000 (Seafood International 2002). Table 1 shows the U.S tilapia imports from American countries from 2000 to 2002 in terms of volume and value.

Table 1: Quantity and value of US tilapia imports by American countries 2000-2002 (based on information from National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002).

Country	Quantity (t)			Value (USD)		
	2000	2001	2002	2000	2001	2002
Brazil	1.8	8.1	119.2	10.5	27.9	458.8
Colombia	29.4	32.2	11.8	154.6	187.9	24.5
Costa Rica	2,683.9	3,108.9	2,711.6	13,583.1	16,485.2	15,570.4
Ecuador	3,447.2	5,159.2	5,802.5	22,801.8	32,719.9	34,899.7
Honduras	1,046.2	1,437.7	2,371.1	5,956.2	8,634.5	14,247.2
Jamaica	197.7	119.1	32.5	1,292.1	766.1	166.5
Panama	161.1	352.5	263.5	1,037.3	2,110.8	945.2
Venezuela	0	0	9.8	0	0	13.5
TOTAL	7,584.5	10,225.9	11,328.3	44,967.8	60,992.7	66,359.3

The import of frozen whole fish has not grown as strongly as imports of filleted products and this component of the tilapia market is becoming less important. However, the strong increase (Table 2) over the last two years shows that there is still a considerable amount of growth potential in the frozen whole tilapia market.

Table 2: Frozen whole tilapia imports to the US by country in 2001 and the first semester of 2002 (Seafood Market Analyst 2002).

Import Origin	Quantity 2002 (kg)	Market Share 2002 (%)	Qty Chg 2001-2002 (%)	Quantity 2001 (kg)	Market Share 2001 (%)
China M	10,525,262	45.7	84.7	10,869,799	28.1
China T	12,188,183	52.9	-9.3	27,599,307	71.3
Thailand	206,452	0.9	540.5	48,799	0.1
Panama	65,448	0.3	>1000	2,379	0.0
Hong Kong	20,866	0.1	NA	NA	NA
Ecuador	11,097	0.0	-85.9	95,399	0.2
Indonesia	2,535	0.0	-93.5	38,899	0.1
Venezuela	1,996	0.0	NA	NA	NA
Viet Nam	939	0.0	122.0	6,946	0.0
Other	NA	NA	NA	68,100	0.2
Total	23,022,778	100.0 %	19.0 %	38,729,628	100.0%

In 2000, Taiwan was again the main supplier of tilapia to the US market, even though its share was substantially below that of previous years when it was about 80%. This decrease is mainly due to production problems experienced in Taiwan especially at the beginning of 2000 when a winter-freeze killed thousands of tonnes of fish (Seafood International 2002). China has taken a considerable percentage of the Taiwanese share of the US market and increased its exports from 230 tonnes in 1993 to 13,500 tonnes in 2000.

Imports of frozen fillets from China and Indonesia have increased rapidly between years, more than offsetting the decline in shipments from Taiwan. Imports from Indonesia reached 2,182 tonnes, almost double their imports in 1999.

Asian imports come from ten countries (Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand and Viet Nam) and the value of these imports was over \$12 million in 2001 (Table 3).

Table 3: Tilapia imports by products from Asia to the US in 2000-2001 (based on information from National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002).

PRODUCT NAME	2000		2001	
	Quantity (t)	Value (USD)	Quantity (t)	Value (USD)
Tilapia fillet fresh	0	0	1,590	10,940
Tilapia fillet frozen	1,415.7	7,130,225	2,443.1	11,872,021
Whole Tilapia frozen	156.2	252,029	162.7	267,683
TOTAL	1,570.947	7,382,254	2,607.458	12,150,644

Prices for most tilapia products are not expected to increase much and they should be pressured by increasing imports from China and Ecuador (USDA 2002a).

Imports of fishery products by the European Union (EU) largely depend on quotas and restrictions. Hardly any fishing industry in Europe comes close to satisfying domestic demand, with as much as an estimated 80% of the German market being supplied by imported fish. According to an EU Market Survey of Fishery Products (2001), it is expected that Europe will become more dependent on imports, due to restrictions on landings and rising consumption levels.

Europe has significantly increased its imports of tilapia from Taiwan, which is the main supplier. Since 1996 European imports from Taiwan have grown by nearly 420% (from 889 tonnes to 3,711 tonnes). The greatest part of these imports consisted of frozen tilapia. European imports of frozen tilapia fillets from Taiwan showed an increase from 0.3 tonnes in 1997 to 228 tonnes in 1999 (Vannuccini 2001).

In Europe, the UK is the leading importer of tilapia from Taiwan with 1,368 tonnes in 1999, followed by the Netherlands, France, Italy, Belgium and Portugal (Figure 5). France, in particular, has shown an impressive increase: in 1996 it imported only 4 tonnes of tilapia from Taiwan and in 1999 imports reached 1,006 tonnes. In 2000, the US exported 14 tonnes of tilapia to Europe (Denmark and Belgium) (Vannuccini 2001).

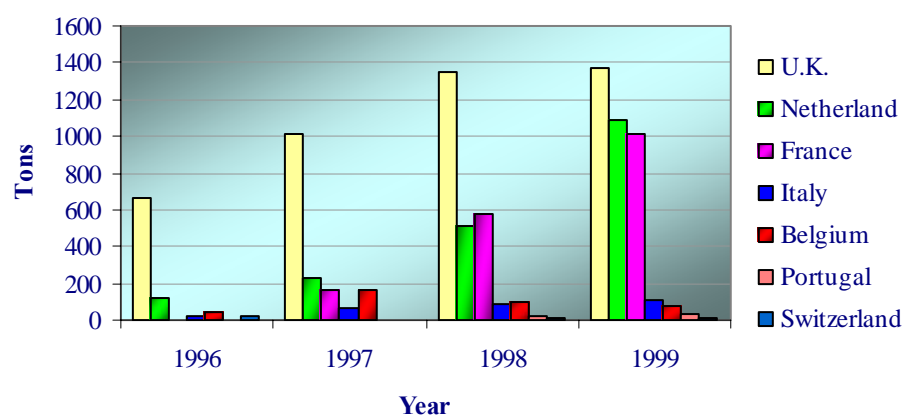


Figure 5: Tilapia imports to European countries 1996-1999 (based on information from FAO 1999).

Tilapia fillets are now being imported into Europe in three forms: fresh (chilled), super cooled and frozen. The size of fillets varies from 100-150 to 200 g and is packed in 3 to 6 kg Styrofoam boxes at 5°C or frozen by system IQF and later packed in waxed cardboard boxes (Alceste 1998).

Both fresh and frozen fillets are sold in France, but Germany, the Netherlands, Belgium, Italy and Spain only import fresh fillets. Only Jamaica and Zimbabwe are known to export farmed tilapia products to Europe but wild-caught tilapia is also exported, mainly from the countries adjacent to Lake Victoria (Uganda, Tanzania and Kenya). Zimbabwe's farmed tilapia (fresh and frozen fillets) is mostly brought into Europe through Belgium. Also, tilapia from Jamaica has been exported to the UK for more than a decade, but fillets were introduced only recently into this market. Jamaica is now slowly moving into the continental European market and has established a foothold in Belgium (Seafood International 2002).

The due trade for the product has not yet been developed and the offered volumes have been too small to justify massive and expensive campaigns. Nevertheless, with the culinary attributes of tilapia, the markets in the countries mentioned above will most likely increase (Alceste and Jory 2001).

4.2 Market for tilapia

4.2.1 The US market

4.2.1.1 a) Characterisation of the US

Currently tilapia is consumed in 13 states. According to the US Census Bureau (1999-2000), the total population in these 13 states is about 61 million of various ethnic groups such as: African (16%), Indian and Alaskan (2.5%), Asian (6%) and Latin (22.3%). The population density in these 13 states is 375.2 persons per mile² (US Bureau of the Census. 1999). According to Fitzsimmons (2000) tilapia production in the US has increased at an annual average rate of 20% since 1991. In 1998 local production (live weight) was as follows (Figure 6): Western Region, about 3,180 tonnes; North Central Region, about 1,723 tonnes; North-eastern Region, about 1,592 tonnes; Southern Region, about 1,575 tonnes; and the Tropical Region, about 180 tonnes.

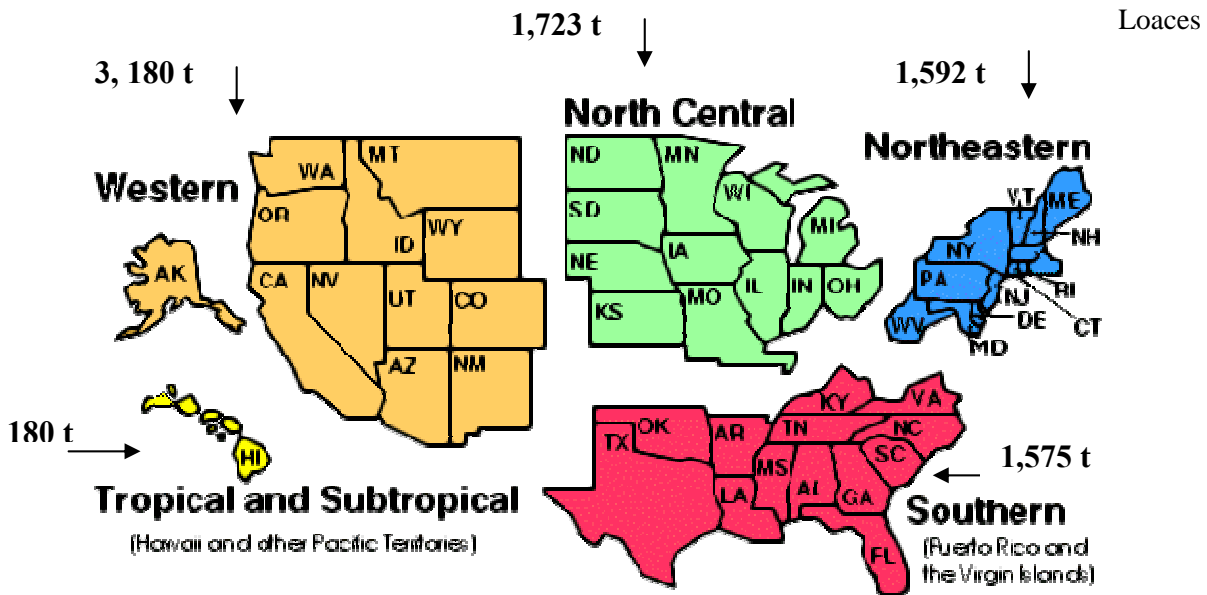


Figure 6: Map of US regions and total production of tilapia in tonnes by region (Kohler C. 2000).

Tilapia producers in the US are competing among themselves as well as with imported tilapia. Frozen products can be shipped from Southeast Asia and sold competitively in the US as can fresh fillets from Central America.

In the North Central Region, there are only a few tilapia producers, but most of them find that marketing their product at a profitable price is difficult. The live whole tilapia market for Detroit, Chicago, and St. Louis can stretch for several hundred miles outside the North Central Region borders (Kohler 2000). In the region, heat from the Southern Minnesota Beet Co-op's wastewater is used to keep water in the indoor tanks at a stable temperature. The Beet Co-op sells primarily live tilapia to Toronto, Calgary, Vancouver, Chicago, Minneapolis and New York City. The fishery justifies spending extra money to deliver the live fish because the value of dead tilapia is 40% lower (Fedgazette 2001).

The primary markets for live tilapia from the North Central Region (NCR) are New York City, Toronto, Washington D.C., Los Angeles, San Francisco and Seattle (Kohler 2000). The American Tilapia Association (ATA) (1999) has identified Chicago, St. Louis, and Kansas City as potential markets for live tilapia. Asians and Hispanics were the primary consumer markets at this time.

The industry is a bit bigger in Michigan's Upper Peninsula. There is some potential for expansion and the region is looking into using heated water from a power plant to raise yellow perch. In many cases, it appears the industry will grow where water is readily available (Fedgazette 2001). In Wisconsin, Minnesota and possibly Michigan's Upper Peninsula, researchers are looking at innovative approaches to fish farming, but with limited success (Fedgazette 2001).

The Northeast Region includes the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and West Virginia. In this region, most tilapia culture has occurred in ponds during summer or in heated units such as re-circulating systems. Commercial culture in the Northeast has not been demonstrated on a sustained basis (Buttner 1997).

In the Southern Region, e.g. Florida, the tilapia sold for human consumption is raised in fish farms or netted from the open waters of the state. Tilapia production in Florida fish farms is primarily the red hybrid tilapia blue (*Tilapia aurea*) and Mozambique tilapia (*Tilapia mossambica*) hybrid. Blue tilapia makes up the largest volume of the wild-caught fishes sold for human consumption, however, some black chin tilapia is netted along the east and west coasts of Florida as an incidental species and sold at the local markets.

Tilapia is produced in ponds and tanks, mainly in central and southern counties of Florida. According to FASP (2002), Florida producers of aquaculture products reported sales in 2001 of \$99.5 million, where tilapia was 1%. This is 16% higher total value than reported in 1999 and is the second highest sales year since 1988.

Tilapia can be raised successfully in the state of Mississippi. There are a growing number of Tilapia operations in the state, concentrated primarily in the lower 1/3 of the state. Most operations are small scale and produce either fingerlings or food-sized fish. Mississippi tilapia farmers must seek out local or niche markets for live whole fish (Msucares 2002).

Domestic production is also expected to increase, but the increase will be limited to live market growth (ATA 1999). As mentioned earlier, the live market represents the largest outlet for domestic producers. About 70% of the US domestic production is sold live to the oriental market. Mozambique tilapia is particularly favoured in live markets in California and Arizona. However, growth in the live market has slowed down during the last few years (Seafood International 2002).

Average prices received for domestic live tilapia ranged \$1.80 to \$2.40 wholesale and \$2.99 to \$5.99 retail. Domestic whole fresh prices ranged from \$1.20 to \$2.00 wholesale and \$1.99 to \$3.49 retail (ATA 1998).

When trying to examine the US market it is necessary to pay attention to where imported tilapia comes into the country, since the annual consumption is only met by a small part with domestic production. Table 4 shows the tilapia imported to the US by regions and states.

Table 4: Tilapia imported to the US by region and state in 1998 and 2001 (based on data from National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002).

Year	Region	State	Total quantity (t)
1998	Western	California	20,791
		Washington	171.5
	North Central	Illinois	1,234
		Michigan	34.836
	North-eastern	Massachusetts	222.3
		New York	679.435
		Washington DC	0.191
	Southern	Texas	372.9
		Florida	3,952.7
		Louisiana	21.8
		Virginia	0.218
		Georgia	1.120
	Tropical and Subtropical	Hawaii	339.1
Total import 1998			27,820.372
2001	Western	California	37,928.63
		Washington	471.029
	North Central	Illinois	3,967.43
		Michigan	7.241
	North-eastern	Massachusetts	550.258
		New York	1,514.727
		Maryland	123.362
	Southern	Texas	1,095.005
		Florida	9,943.143
		Louisiana	80.833
		Virginia	15.558
		Georgia	197.399
	Tropical and Subtropical	Hawaii	442.804
Total import 2001			56,337.449

Table 4 shows that the imports increased by 28,517 tonnes (102.5%) from 1998 to 2001. The state of California imports the most tilapia 20,791 tonnes in 1998 and 37,929 tonnes in 2001 (75% of the total tilapia import in 1998 and 67% in 2001).

Florida and Illinois are also important states in the context of tilapia imports. Florida increased its ratio of the total US tilapia import from 14% in 1998 to 18% in 2001, with 5,991 tonnes more imported in the later year. Illinois increased its ratio from 4% to 7% during the same period with 2,734 tonnes more imported. Washington D.C. imported less than 200 kg in 1998 and nothing in year 2001. Apart from that, Michigan is the only state where tilapia imports decreased during this period, from 34 tonnes in 1998 to 7 tonnes in 2001.

4.2.1.2 b) Tilapia consumption

Consumption of seafood by Americans seems to be related to various population characteristics such as, age, income, education and language. Other factors such as city size, economic development, race and population density also seem to affect the seafood consumption of the Americans (Kumar and Nagpal 2001).

A survey conducted in the US in 1987-1988 showed that people with low income consume less fish than households with average income (Huang and Lin 2000). In research done by the Economic Research Service of the U.S Department of Agriculture in 1998 it appears, according to Table 5, that single persons spend the most of any household type on fish and seafood. In female-led households, expenditure is higher on fish than if the household is led by a male. Couples that do not have their own children in the home spend more on fish and seafood than couples with children.

Table 5: Annual food expenditures per person by household type in 1998 in USD (<http://www.ers.usda.gov/Briefing/Consumption/Data/consumption.xls>).

	All	Couple Only	Married couples with own children				Male Head	Female Head	One Person	All Other
			Oldest Child Under 6	Oldest Child 6 to 17	Oldest Child Over 17	Other				
Fish and seafood	40,2	54,02	38,69	32,64	35,15	41,11	25,31	35,41	55,13	31,26
Canned fish and seafood	5,74	8	4,93	4,2	5,47	3,54	5,1	4,87	9,45	4,91
Fresh fish and shellfish	23,96	33,12	23,83	18,21	19,31	26,99	18,88	22,75	32,73	18,23
Frozen fish and shellfish	10,5	12,9	9,93	10,22	10,37	10,58	1,32	7,79	12,95	8,12

Annual per capita fish consumption in 2000 was 7.09 kg, up from 5.5 kg in 1980 (Figure 7). Tilapia consumption is expected to exceed 181,820 tonnes per year by 2005, according to the Bureau of Fisheries (www.bioselters.com 2001). Tilapia is becoming the aquaculture industry's white fish of choice because it has the hardy growing characteristics necessary for a successful product. Tilapia consumption is expected to exceed 181.6 tonnes per year by the year 2005.

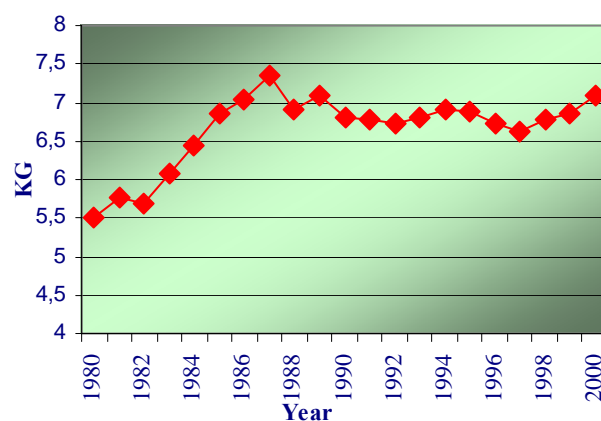


Figure 7: US seafood consumption per capita 1980-2000 (based on information from USDC/NOAA/ National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002

The market for tilapia is growing fast in the US (Figure 8). In the past tilapia was considered a low value fish, suitable only for the ethnic market. Nowadays, it has captured part of the US market that was traditionally dominated by whitefish species (Fitzsimmons 2001).

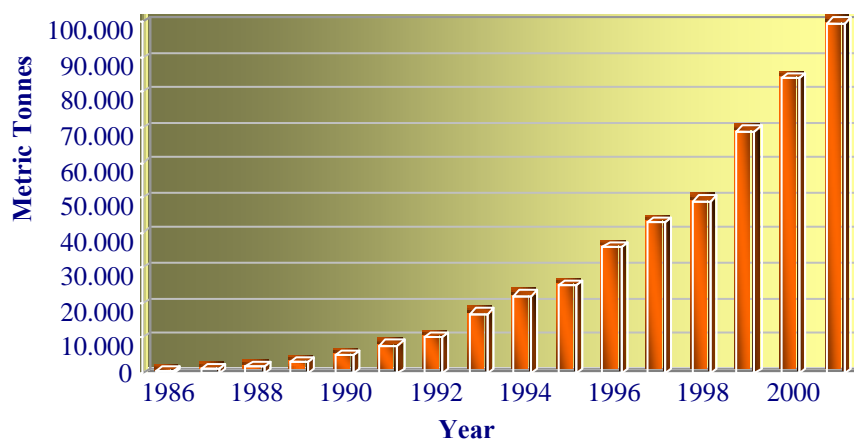


Figure 8: US tilapia consumption (tonnes) 1986-2001 (Fitzsimmons 2001).

The bulk of tilapia consumed in the US is imported, even though domestic production has increased substantially over the past few years making it the fastest growing species cultured in the US going from 20 tonnes in 1988 to 8,250 tonnes in 1998, but with a 2% decline experienced in 1999 (Vannuccini 2001). This decline is linked to the changes in the live market, which has slowed down in recent years. The live market, currently dominated by Asian Americans, represents the largest outlet for domestic producers.

4.2.1.3 c) Supply outlook

Interest in tilapia farming has grown considerably. The whitefish industry is looking for cheap substitutes and tilapia will most likely enter this market on a large scale during the next five years. Supplies of frozen tilapia fillets are expected to grow only moderately in the near future and the increased availability of fresh fillets from Latin America is also expected to limit demand for frozen fish (Seafood International 2002).

Changes are occurring in the fresh and frozen fillet markets. Fresh tilapia fillets have showed the most rapid growth of any tilapia product. Some US producers are now distributing fillets and imports have gone from 586 tonnes in 1993 to 3,590 tonnes in 1998. The primary sources of fresh fillets have been Costa Rica, Jamaica and Ecuador (Fitzsimmons 2000).

In 2000, Ecuador increased its tilapia exports to the US, replacing Costa Rica as the leading supplier of fresh fillets to the US market. Through 2001 US imports of fresh tilapia fillets from Ecuador were 4,924 tonnes (Table 6). In 2002, Ecuador shipped 6,095 tonnes of fresh fillets to the US, 22 % more than in the previous year and 50% of all fresh fillets (USDA 2002b).

Table 6: Fresh fillet tilapia imports to the US by country (in tonnes), 2000-2002 (based on information from National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002).

Country	2000	2001	2002
Brazil	1.8	0	103.3
China	59.42	191.1	791.1
Colombia	29.40	32.2	0
C. Rica	2,683.9	3,108.9	2,967.4
Ecuador	3,252.5	4,924	6,095
Honduras	1,037.8	1,437.7	2,612.8
Jamaica	176.6	91.6	163
Panama	159.3	35.2	138.0
Taiwan	82.5	76.1	219.6
Thailand	0	1.6	26.9
Others	18.8	22.4	91.4
TOTAL	7,502.02	10,236.0	13,062.2

US supply of tilapia continues to increase, with total imports over the first half of 2002 at almost 31,780 tonnes, up 22% from the same period in 2001. Tilapia supply is usually greater in the second half of the year, so total shipments for 2002 are expected to reach between 63,560 and 68,100 tonnes. Overall, prices for imported tilapia products are expected to remain slightly higher than previous year levels in the second half of 2001. This is due to continued growth in the volume of filleted products being imported (USDA 2002b).

4.2.1.4 d) Price trends

Tilapia prices in the US vary according to product form, size and market area. In general, large fresh whole tilapia and tilapia fillets are sold at the best prices; the lowest prices are paid for live fish with prices fluctuating according to size. Larger fish command higher prices. Prices for fresh and frozen fillets have remained stable during the last three years.

Consumers prefer live fish greater than 450 g. Fish of 700-800 g bring the highest prices. Fillets are typically graded into 113-170 g and 142-198 g packages, with the larger grade bringing \$0.20 to 0.50 more per kilogram. Frozen fillets are about 30% cheaper than fresh fillets (Seafood International 2002).

In May 2001, prices for frozen fillets from Indonesia and Taiwan were slightly higher than those from Ecuador, whilst those from China were lower. The price for frozen tilapia fillets declined in May 2001 and again in July that year but recovered again staying stable, whilst prices for fresh fillets declined in July 2001 (Seafood International 2002).

During the period 1999-2002 tilapia prices in the US were stable. Prices for fresh and whole tilapia did not show significant fluctuations in the last three years (Figure 9), only a slight decrease in frozen fillets in the same period. Overall tilapia prices in this period were USD 2.40/kg.

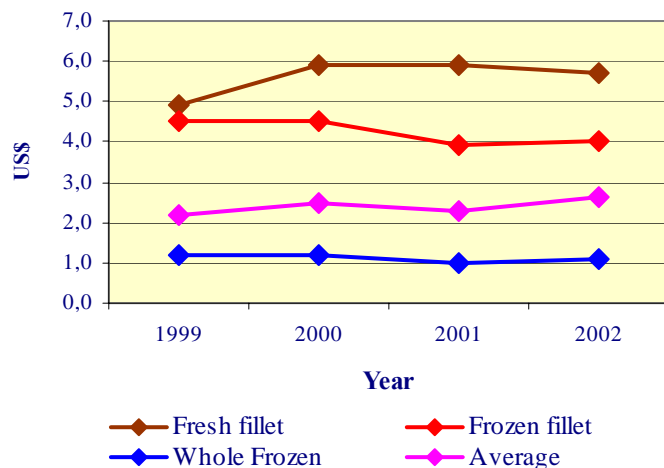


Figure 9: Price trends in tilapia products in the US (based on information from National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002).

The majority of tilapia imported in the same period (1999-2002) was frozen whole tilapia (Figure 10) mainly from Taiwan (15,916 tonnes) and China (11,621 tonnes).

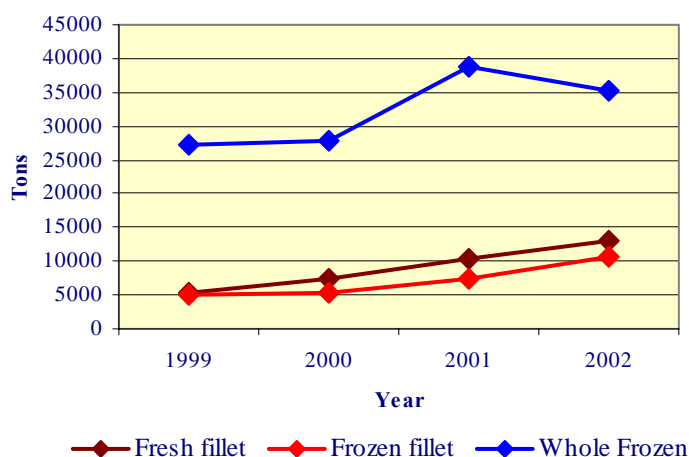


Figure 10: Quantity of tilapia imported to the US in 1999-2002 (based on information from National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002).

Imports of tilapia into the US have significantly increased since the beginning of 2001 and prices have dropped as a result (Seafood International 2002). Overall, tilapia imports (frozen whole and fresh fillets) averaged \$2.55/kg in the first half of 2002, up 20 cents from the previous year and about the same as in 2000. The value of all tilapia imports rose to \$80.6 million in the first half of 2002 (USDA 2002b).

4.2.2 The Asian market

4.2.2.1 a) Tilapia aquaculture developments

Tilapia is quickly becoming one of the popular species of freshwater fish in Asian aquaculture. In Asia, aquaculture has expanded during the past 11 years and has contributed substantially to the region's food security, employment and foreign exchange earnings. According to FAO statistics, production of tilapia in Asia increased almost 40% from 714,000 tonnes in 1996 to 998,000 tonnes in 2000 (Figure 11).

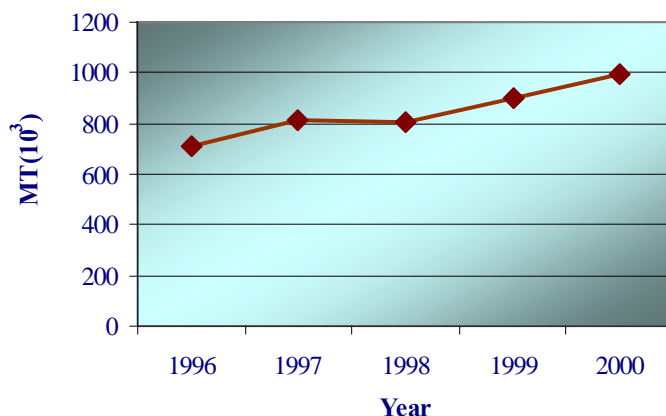


Figure 11: Trends in production of tilapia in Asia (based on information from Varadi *et al.* 2000).

Markets for whole frozen tilapia are large and growing (ATA 1999). These markets, mostly supplied by products from Taiwan and increasingly the mainland of China, have a much lower growth rate than markets for fresh fish fillets. Whole frozen fish still accounts for 50% of all tilapia imports. The primary source of frozen tilapia fillets has been Indonesia and Thailand, but increasing amounts are imported from Taiwan.

4.2.2.2 b) Prices

In 2001, the average export price from Asia showed that frozen fillets from Indonesia were \$4.98/kg, well above the average value of frozen fillets from China or Taiwan (USDA 2002a) as shown in Table 7. While the market for frozen fillets continues to grow, producers in China and Taiwan are currently faced with prices that are low enough to depress economic incentives to process the tilapia into fillets. According to National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002, the average export price for frozen whole tilapia decreased by 21 cents in 2002 in relation to the previous year.

Table 7: Tilapia average export price 2001-2002 in the Asian market (based on information from National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002).

Product	Fresh Fillets		Frozen Fillets		Frozen Whole	
	2001	2002	2001	2002	2001	2002
China	3.28	3.14	3.39	3.91	0.96	1.04
Indonesia	-	-	4.98	5.07	1.80	1.10
Malaysia	-	-	1.31	-	-	-
Philippines	-	-	4.36	-	1.07	-
Taiwan	2.96	2.64	3.38	4.51	0.98	1.12
Thailand	6.88	4.63	3.91	4.81	2.30	1.45
Viet Nam	-	2.64	3.75	4.84	1.15	1.11
Total	4.37	3.26	3.58	4.63	1.37	1.16

4.2.3 The European market

4.2.3.1 a) Aquaculture production

The most important market for tilapia that has arisen lately is the US, but there is an increasing interest for tilapia in Europe. Still tilapia is competing with other white fish, such as cod and haddock in many of the European countries. The price of these species has also risen because catch in the past several years has diminished (Alceste 1998).

In spite of the substantial differences seen in aquaculture production in the different regions of Europe, marketing problems are a major constraint for immediate aquaculture development. In Central and Eastern Europe, the capacity of local markets has diminished due to decreasing purchasing power, and most of their aquaculture products have little export potential (Varadi *et al.* 2000).

The contribution of freshwater aquaculture other than tilapia has declined, both in quantity and value and freshwater production has stagnated at around 340,000 tonnes per annum. Inland aquaculture plays an important role in rural areas, where freshwater fish farming is an important source of fresh food and provides employment. The main constraint for the development of inland aquaculture is competition for limited and vulnerable freshwater resources and obtaining permission for access. Freshwater aquaculture is especially important in Central and Eastern European countries, but is likely to be bound by considerable structural and economical problems during their transition to market economies (Varadi *et al.* 2000).

4.2.3.2 b) Competitors

The main competitor of tilapia in Europe continues to be the Nile perch, a white-fleshed freshwater fish, captured in Lake Victoria by Uganda, Tanzania and Kenya. The low price of Nile perch on the European market (USD 2.80) has limited market development for the higher priced tilapia (USD 4.80) (Alceste 1998). Catch of Nile perch in recent years has been around 400,000 tonnes per year.

Tilapia is also competing with cod and haddock, which are much more firmly established. However, cod supplies in recent years have decreased and prices have increased, so tilapia appears to be in a good position to capture the European market

share from these species. It may be necessary to promote tilapia generically with consumers and wholesalers, because consumers' awareness of tilapia is low and there is much room for expanding its market share (Alceste and Jory 2001).

4.2.3.3 c) EU consumption

The consumption of fishery products in the EU has increased in recent years, although the rate of increase is now likely to be more modest than in the late 1980s (EU market survey 2001). The increased popularity can be explained by higher sales of smoked fillets (particularly trout, mackerel and salmon) and wider marketing of fishery products throughout Europe.

The survey reflects that the estimated total consumption of fishery products (excluding canned fish) in the EU amounted to 3.3 million tonnes in 1999. In terms of value, Italy is the market leader accounting for a market share of around one third of total EU sales, followed by Germany (15%), Spain (15%) and France (9%). Between 1995 and 1999, the major markets stabilised in terms of volume, although in terms of value they increased except Spain. Fresh chilled and frozen fish is relatively more important in Italy than in other EU member countries, representing a share of 40% of total EU chilled and frozen fish sales in 1999.

In 1999, total spending on fish products in the EU is estimated at USD 27 billion, indicating a per capita consumption of USD 73 in that year, according to the EU Market Survey on Fishery Products (2001). As shown in Figure 12, fish is considerably more popular in Central and Southern European countries than in other countries as the consumption per head in Italy, Spain, Greece and Portugal is higher than in other European countries.

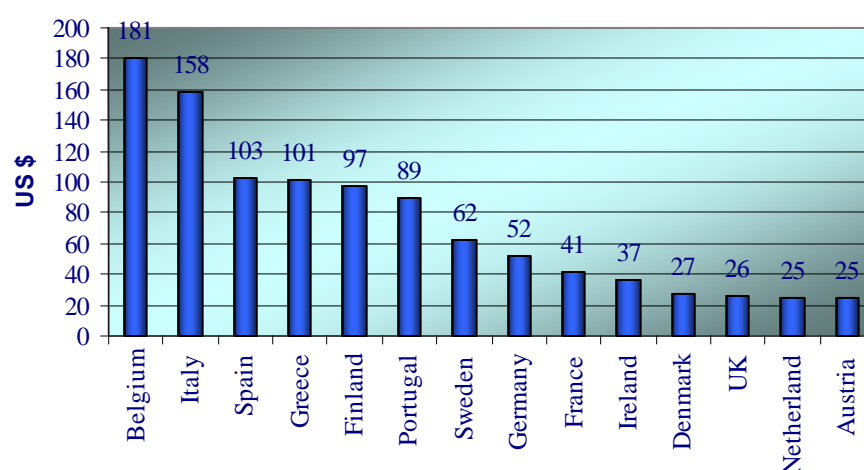


Figure 12 : Per capita spending on fishery products in Europe 1999 (based on information from EU 2002).

The increase in consumption has generated a strong dependency on seafood imports. Countries such as Spain, France, Italy and Germany, import over 22% of the global production (Alceste and Jory 2001). This dependency on fish products from outside the EU tends to increase due to the policy to reduce fishing effort currently implemented by EU countries in its common fishing areas. To have access to the EU

seafood markets strict sanitary norms must be followed to guarantee products of the highest quality.

Tilapia sales have good potential in the European market since they may be a substitute for many whitefish species and Europe is the world's largest market for fresh and frozen cod-like groundfish products. High quality tilapia of larger sizes could develop a better acceptance by the market. Prospects, at least in the short term, are substantially better in Central and Northern Europe compared to Southern European markets. The flesh of tilapia is perhaps too delicate and sweet and not savoury enough for Mediterranean countries (Vannuccini 2001).

4.2.3.4 d) Price

The most recent tilapia price in the EU is USD 6.75/kg skinless fresh fillets, as shown in Table 8 (European Union 2002). This market is expected to develop rapidly in Europe during the next few years and tilapia will most likely take part of the market share from traditional whitefish species (Seafood International 2002).

Table 8: Most recent tilapia price in the European market 2002 (Globefish 2002).

Trade Name Fish Specie	Product Form	Grading	Price per Kg
			As stated £ USD
Tilapia O. niloticus	Fresh-fillets- skinless, PBO	100-200 g	7.15 6.75

There are also some quantities of wild-caught tilapia from Lake Victoria being exported to Europe. Prices have been about 20% below those for farmed tilapia and this product has consequently captured part of the market share. Supplies of wild tilapia are irregular and import quantities have varied a great deal. On average, about 25 tonnes of wild tilapia have been imported per month (Alceste and Jory 2001).

4.2.4 Market of the Americas

The market of the Americas is considered one of the main competitors for the export of tilapia from Cuba. For that reason the behaviour of this market will be analysed and its present tendencies.

4.2.4.1 a) Characterisation of countries

Brazil

Brazil is one of the big producers in the American continent, producing 28,819 tonnes in 2000 (Varadi *et al.* 2000). Tilapia was introduced in the 1950s and the original production was for local consumption, as was the case in most other countries. Brazil may have the most diversified tilapia industry of any country in the region (Fitzsimmons 2000).

Most of the production in Brazil is still for domestic consumption. Brazil has huge warm water resources, a large domestic market, and proximity to the US and European markets and therefore is set to expand its production.

Tilapia from cage-cultured systems provides the main supply of tilapia in Brazil. The estimated production cost is USD 1.10/kg. The majority of the tilapia produced in Brazil is sold in the state of Sao Paulo. Tilapia is sold to the public at a price between USD 1.00 and 2.20/kg. High levels of integration between private and public farmers with key players in this industry such as research institutions, feed manufacturers and nylon netting manufacturers etc. have made Brazil the major tilapia cage culture country in the Latin-American region (Alceste and Jory 2001). According to National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002. Brazil exported 1.8 tonnes of fresh fillets to the US market at an average price of USD 5.96/kg in 2000.

Colombia

The fish aquaculture industry in Colombia produces 56,530 tonnes of which 23,000 tonnes is tilapia to supply local demand. According to Espejo (2000), culture of freshwater fish, mostly tilapia, has expanded significantly in Colombia in recent years. The whole fish is scaled and gutted, and retail price fluctuates between US\$ 1.50 to 1.80/kg. Consequently, the emerging local market where tilapia is becoming high in demand has kept most production in the country. Local prices are superior to those prevailing in international export markets, particularly the US, so there are very little exports of tilapia (Alceste and Jory 2001).

For example, official US import data show that Colombia exported from 3 tonnes of fresh tilapia fillets in 1999 to 32.2 tonnes in 2001. Per capita consumption of tilapia in the country in 1999 was 7.97 kg. Production cost for tilapia raised in cages is around USD 1.25/kg (Alceste and Jory 2001). Red tilapia culture has developed significantly in Colombia in recent years. According to National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002, Colombia exported to the US market 29.4 tonnes of fresh fillet at USD 5.26/kg in 2000. In 2002 Colombia exported to the US market 11.8 tonnes of tilapia products (frozen fillet and whole tilapia) at an average price of USD 2.06/kg. Prospects for further development are excellent (Fitzsimmons 2000)

Costa Rica

Nile tilapia farming in Costa Rica has developed to such an extent that the country has become a global exporter of the product and is one of the main suppliers of fresh fillets to the US. Production cost for tilapia is around USD 1.20/kg. The number of people dependant on the aquaculture industry grew from 772 in 1999 to 915 in 2000 (Alceste and Jory 2001). Of the total number of producers, 74.64% produce Nile tilapia, 18.9% trout, 6.13% shrimp, and 0.33% other products (www.fis.com/fis/worldnews, September 2002). According to National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002, exports of fresh fillets were priced at USD 5.06/kg in 2000. Exports of tilapia fillets (fresh and frozen) had reached USD 16.5 million in 2001 and USD 17 million in 2002, with an average price of USD 5.5/kg (National Marine

Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002).

Ecuador

With relatively little effort, Ecuador has managed to penetrate the US market with a high quality product. They are successfully competing in volume and quality with the strongest tilapia producers of the region. Currently, Ecuador is adding tilapia seawater culture to their traditional shrimp production lines, not with the intention of substituting crustacean production, but to provide a feasible alternative to relieve outbreaks of White Spot Shrimp Virus by removing dead and moribund shrimp.

In 2000, exports from Ecuador increased by 80% to 3,447 tonnes. Ecuador, with its large farmed shrimp industry, is looking to diversify their aquaculture production, and if tilapia prices continue to remain strong, it is expected to continue to increase production, possibly converting more shrimp ponds to tilapia production.

No one doubts that more tilapia from Ecuador is on the way. With production costs of about USD 1.10/kg, tilapia is a profitable fish at current market prices, a sure formula for increased production. According to National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002, Ecuador sold tilapia products (fillets and whole fish) at an average export price USD 6.61/kg in 2000 and USD 6.00/kg in 2002. In 2000, 24.2 tonnes of frozen whole tilapia were exported at a price of USD 4.98/kg to the US Nevertheless, in 2002 only 16,3 tonnes entered the market at USD 2.37/kg, showing a decrease in volume and price.

Honduras

Export-oriented production of tilapia began in 1990 and has grown rapidly since 1991-1992 (Teichert- Coddington and Green 1997). In 1997, there were 15 tilapia farms with a total water surface of 185.3 ha, owned by individuals, local investors, and international investors (Green and Engle 1997).

Exports of tilapia to the US from Honduras have grown consistently since 1992. Currently, production from intensive farms has estimated production costs at about USD 1.20/kg. Exports from Honduras were up 35% to 1.0 million tonnes or 14% of fresh tilapia fillet imports (USDA 2001). In 2000 Honduras exported fresh fillets to the US market at USD 5.70/kg and frozen whole tilapia at USD 4.92/kg. The fish marketed locally as whole, gutted fish was about USD 1.80 to 2.10/kg.

Two important factors that stimulated the establishment of commercial intensive tilapia culture in Honduras include the rapid development of the US market for tilapia, especially for fresh and frozen fillets, and the transfer of tilapia sex reversed fingerling production technology to the private sector. Another factor that promoted development of the commercial tilapia industry was government support from the mid to late 1980s through the early 1990s for expansion of non-traditional agricultural exports, which included tilapia (Fitzsimmons 2000). Fish destined for export are gutted following harvest, while fish destined for local consumption are purged only occasionally. Skin-off, pin-bone fillets are the predominant product form for export markets, while whole (scales-on), gutted tilapia is the principal product form for

domestic markets. Target size fish for export processing is 500-700 g minimum, while 250-450 g fish are marketed locally.

Mexico

Demand for tilapia in Mexico has increased, with these fish stocked into reservoirs across the country to complement catches of indigenous species. There are hatcheries that stock some reservoirs, and self-sustaining populations have become established in many areas. Annual consumption exceeds 100,000 tonnes and is all supplied by domestic production. Their production cost is about USD 1.25/kg and is marketed locally as whole, gutted fish at about USD 2.00 to 2.25/kg. All production in 2000 was for domestic consumption.

Panama

Tilapia culture in Panama, originated in the 1940s with the introduction of *O. mossambicus* into dams belonging to a Cemento de Panamá company, for recreational purposes. In 1972, the INA began some experimental tilapia trials in the Province of Veraguas, as part of a community project for low-income residents in the area. At that time, different tilapia species were introduced and hybridisation programmes were implemented to obtain all male populations. In 1987 in the outskirts of Panama City the first commercial tilapia farm was built, and the production was destined to live fish sales and white cloth restaurants in the capital.

Nowadays, tilapia culture has become a national agricultural priority in Panama. Particularly after the White Spot Syndrome outbreak, some growers have adopted *O. niloticus* as an alternative, penetrating the US market with fresh and frozen fillets. The other commercially important tilapia activity currently taking place is the floating cage system in Lake Gatun, where 18 units of 48 m³ produced over 6 tonnes per cage of fish with an average live weight of 1 kg. This product is processed into fresh fillets and sold to Miami (Alceste and Jory 2001). According to National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002, Panama exported 161 tonnes of tilapia products to the US market (159.3 tonnes of fresh fillets and 1.8 tonnes of frozen whole tilapia) at an average price of USD 6.43/kg (USD 6.44/kg for fresh fillets and USD 5.93/kg for whole tilapia) in 2000.

Venezuela

Aquaculture development has been slow due to government environmental restrictions but has seen substantial growth in the last few years. According to Chiappe (1998), aquaculture has taken off in Venezuela, largely because the industry has developed clear rules.

Commercial culture of red tilapia hybrids began in 1992. Previously, *Oreochromis mossambicus* had been introduced in 1959 from Trinidad and stocked in Valencia Lake (north-central region of the country) and some coastal lagoons in northeastern Venezuela. In Venezuela red hybrid lines imported from Jamaica, the US, and Israel are used in aquaculture (Polanco 1998).

In Venezuela, tilapia production has increased steadily and was estimated at 2000 tonnes in 2000 (Alceste and Jory 2001). The fish is gutted and sold whole mainly on the domestic market. In Venezuela the whole frozen fish is sold at the retail price of USD 1.90 to 2.30/ kg. Most production was consumed in the country during 2000 and 2001, only 9.7 tonnes were exported to the US market at USD 1.38/kg in 2002 (NMFS 2002). Blue tilapia is mainly produced for fillet and during 2002 frozen fillets were imports to the US at USD 1.34/kg (NMFS 2002).

Jamaica

Tilapia cultivated in Jamaica includes the Nile tilapia at a low production cost (USD 1.20/kg) (Fitzsimmons 2000). There is a year-round growing season for tilapia and Jamaica has the advantage of adequate water supply, level land of high clay content, relatively cheap labour and good air transport linkages to North America and Europe (JSDNP 2001). According to NMFS (2002), exports from Jamaica to the US in 2000 were at an average price of USD 6.53/kg (USD 6.83 for fresh fillets and USD 4.09 for frozen fillet). In 2002 the average prices were USD 5.05/kg (USD 6.33/kg for fresh fillet and USD 3.86 frozen fillets).

The changing dietary trend towards fresh, healthy low-calorie foods has led to an increase in fish consumption in Jamaica. The demand for fresh-water fish has increased steadily, as acceptance of the tilapia red hybrids has become more widespread. There is also more consistent supply and increased quality as a result of production in a controlled environment (JSDNP 2001).

Table 9 summarises the competitors in the American continent in relation to market trends in 2000.

Table 9: Market trends of American countries in 2000.

Country	Prod. cost (\$/kg)	Total production (t)		Product form	Price per kg (USD)	
		Domestic	Export to US		Retail Domestic	Export (to US)
Brazil	1.10	28,817	1.8	Fresh fillet	N/A	5.96
			0	Frozen fillet	N/A	N/A
			0	Frozen whole	1.00-2.20	N/A
Colombia	1.25	22,841	29.4	Fresh fillet	N/A	5.26
			0	Frozen whole	1.50-1.80	N/A
C. Rica	1.20	5,417	2,683.9	Fresh fillet	N/A	5.06
Ecuador	1.10	5,754	3,253	Fresh fillet	N/A	6.71
			170.4	Frozen fillet	N/A	4.99
			24.2	Whole frozen	N/A	4.98
Honduras	1.20	3,954	1,037.8	Fresh fillet	N/A	5.70
			8.4	Whole frozen	1.80-2.10	4.92
Mexico	1.25	6,726	0	Frozen whole	2.00-2.25	0
Panama	1.30	1,020	159.3	Fresh fillet	N/A	6.44
			1.8	Whole frozen	N/A	5.93
Venezuela	N/A	1,050	0	Frozen whole	1.90-2.30	0
Jamaica	1.20	4,302	176.5	Fresh fillet	N/A	6.83
			21.2	Frozen fillet	N/A	4.09
Average	1.20	79,881	7,341.2	Fresh fillet	N/A	5.96
			191.6	Frozen fillet	N/A	4.89
			34.4	Whole frozen	2.27	5.02

The information about production in 2001-2002 is not available in FAO statistics; therefore in the table above, the analysis refers to results obtained in 2000.

The table shows that the greatest producers of tilapia in the American continent appear to be Brazil, Colombia and Mexico from 6,000 to 28,000 tonnes in 2000.

Honduras exported 8.4 tonnes of frozen whole tilapia to the US, a lower volume than fresh fillets (1,037 tonnes); which explains why Honduras received higher prices for frozen whole tilapia than fresh fillet.

The average price for fresh fillets was USD 5.96/kg for 7,341.2 tonnes, USD 4.89/kg for frozen fillets with 191.6 tonnes and USD 5.02/kg frozen whole tilapia for 34.4 tonnes, where frozen whole tilapia received a price higher than frozen fillets. When analysing Figures 9 and 10, we can observe that imports of frozen whole tilapia from Latin American countries was only 34.4 tonnes increasing the price, whilst prices of the Asian countries are lower than the American countries because they imported a greater quantity of frozen whole tilapia (27,746 tonnes) to the US

4.2.4.2 b) Future trends in the Americas

The demand for tilapia is likely to continue to expand as consumers become more and more familiar with the qualities of this farm-raised fish. Producers will increasingly recognise that high quality tilapia fillets are in high demand by US consumers. In the face of growing competition for the US market between many farms throughout Central and South America, it is likely that only the largest and most cost effective producers will prosper in the long term (AquaSol, Inc. 2002).

Fitzsimmons (2000) makes the following predictions about future trends in America::

- ✓ Production will be 75% *O. niloticus*, 20% Red strains, *O. aureus* and *O. mossambicus* mostly for hybridisation.
- ✓ Production will be 50% intensive ponds, 25% cages, and 10% intensive recirculating systems.
- ✓ Processing and value- adding will intensify in producing countries.
- ✓ Production in the Americas will reach 500,000 tonnes by 2010 and 1.0 million tonnes by 2020.
- ✓ Polyculture with shrimp will become common in most shrimp farming areas.

4.3 Cuban tilapia industry

4.3.1 Potential production in 2002-2005

According to INDIPES (2002), the annual production of tilapia in Cuba was between 1,500 and 2,500 tonnes from 1995 to 2001 (Figure 13) including production from ponds, cages and reservoirs. In 1998-1999, production decreased due to a severe drought that affected the aquaculture industry and difficult financial situation of the Fisheries Ministry (OPCIONES 2002).

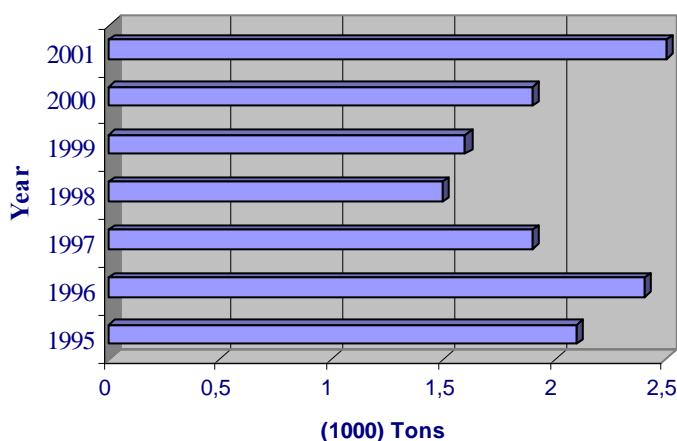


Figure 13: Production of tilapia in Cuba 1995-2001 (based on information from INDIPES 2002).

The production goal for 2005 is about 9,500 tonnes (INDIPES 2002). To reach the goal, 1,000 ha of land will be taken for tilapia production.

In order to establish successful production of tilapia, infrastructure and human resources are equally important. Qualified staff ensures that the industry receives adequate information about the impact of aquaculture and that there is permanent communication between aquaculture farms and processing plants.

Cuba has modern processing plants that have been built to the highest standard and in compliance with the European Community Directive (EC91/493). A quality assurance team, laboratories and internal monthly audits guarantee food security. Every employee is trained in hygiene and food safety. The HACCP System has been introduced and implemented in more than 10 processing plants, four of which are approved by the European Community (Commission Decision 98/572 EC).

Despite intense flavour and high fat content (5%) bighead carp is the leading aquaculture species in the Cuban domestic market today (CIP 1999). This is because it is produced as a value added product. Tilapia with lower fat content (1.6%) has the potential to compete with bighead carp.

Actually, tilapia is marketed frozen but recently the industry has begun working with fresh products. These products comply with temperature according to the specific requirements of customers. Frozen products are kept below -18°C. The fillets are

graded and packed to give customers full portion control. Table 10 shows the different tilapia products that are being exported.

Table 10 : Tilapia products exported from Cuba (based on information from INDIPES 2002).

Product	Size	Packaging
Tilapia Fillet IQF	up 227 g	Interleaved in carton liner 2kg (2x10) in master of 20 kg
Whole Tilapia IQF	(450-500; 500-700; 700 up) g	Individual bags in master of 15 kg

Much effort has gone into the implementation of ISO 9000 and ISO 14000. Reduction of taxes and tariffs on imports of fish processing technology is an effort to improve technology and control polluting effluents (Cuba-ICM.1999). Nevertheless, high costs of processing still affect economic efficiency. This increase is mainly due to the value of imported packing materials and maintenance expenses of freezing equipment (INDIPES 2001).

4.3.2 Cuban distribution system

The industrial production for the domestic market is a network of 152 fish shops distributed around the country, and supplies over 11 million inhabitants, (77.5 % in the urban areas and the 22.5% the rural) with fish. The domestic sales of tilapia in Cuba have increased more than exports in the last two years (INDIPES 2001). Industrial production destined to export, includes a channel of distribution from processors to exporters. Communication in this channel is not always effective. The use of middlemen often decreases effectiveness in the performance of basic marketing tasks (INDIPES 2001). On the other hand, insufficient transport equipment to transfer products affects the distribution time (INDIPES 2002). The marketing channel of export Cuban tilapia is represented in Figure 14.

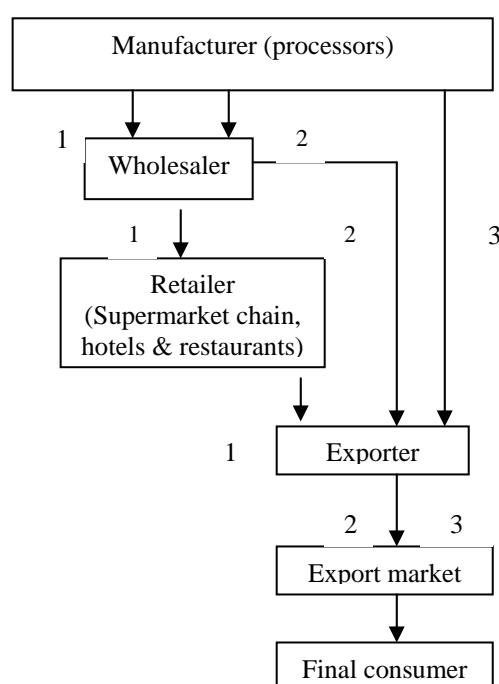


Figure 14: Marketing channel for export Cuban tilapia (INDIPES 2002).

The processors provide the fish fresh or frozen depending on demand. Fresh fish is transported in insulated boxes with ice and the frozen fish is processed in the industry according customer requirements. The fish is sold gutted to avoid decomposition risks. Prices are generally competitive and determined by the market (INDIPES 2002).

The wholesaler (distributor), dealing in the sale of fresh and frozen products and has the capacity to buy directly from processors. They are located in three large regions of the country (west, centre and east). These specialists aim their sales towards supermarket chains, restaurants and hotels in Cuba.

The chain of retailers realise the sale of a very wide range of products, including fresh fish, to supermarket chain, hotels and restaurants in Cuba. They have special service requirements and financial capacity to support contracts and sales promotions.

The exporter carries out the sale of products to the export market, obtaining the product directly from the processors or through the wholesaler. Their functions relate to current market trends, i.e. prices fluctuations, risk, inspection and users. They pay with letters of credit, which make funds available to the seller upon shipment.

Export markets such as the Caribbean market, is a company market where Cuban exporters sell tilapia products. Later the company sells tilapia to the final customer. The exporter holds on for himself or herself information about the final customer.

Promotional activities are integrated with the distribution system to stimulate target market response. These include: exhibitions, free sample or tasting offers and in-store demonstrations. The exhibitions are more common than the rest, but more promotional activities are needed.

4.3.3 *Export trends*

According to INDIPES (2001) the total export value of tilapia during the period 1995-2001 was USD 15 thousand (Figure 15). It reached its lowest level in 1998-1999. Production and the export price declined. In relation to the production, the high cost of imported feeds and human errors also increased (OPCIONES 2002). In this period, the product was ready to export to Spain but due to the international political situation and the trade embargo placed on Cuba by the US, Cuba lost the Spanish market, the inventory increased, a small amount of tilapia entered only to Caribbean market, and export prices dropped, destining a lot of tilapia to domestic market.

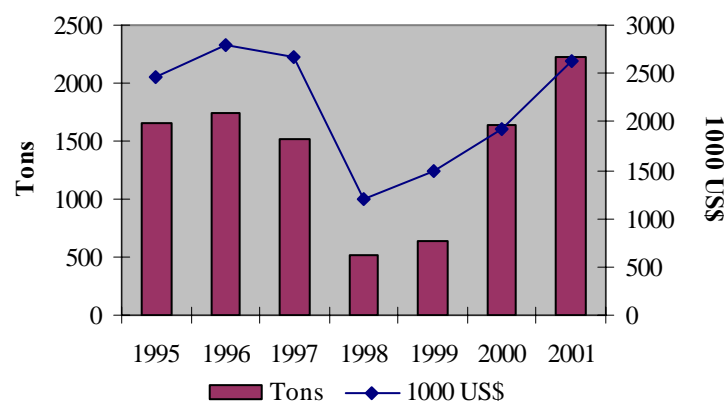


Figure 15: Cuban tilapia export, quantity and value 1995-2001 (based on information from INDIPES 2002).

The behaviour of the price during 1995-2002 is shown in Table 11.

Table 11 : Cuban tilapia frozen whole average price 1995-2001 (based on information from INDIPES 2002).

Price per Kg (USD)	1995	1996	1997	1998	1999	2000	2001	2002
Export	1.17	1.15	1.41	-	0.93	1.01	1.06	2.70
Retail Domestic	-	-		0.85-1.10	1.10-1.20	0.95-1.30	-	-

4.3.4 The new product development process

If the market is not growing, or the business is not profitable, one possible strategy for growth is to add value to products currently being produced. In the context of aquaculture products, there are a couple of definitions of “value added” which may apply. They are: value- added to the producer and value- added to the consumer (Howard 1999).

“*Value- added to the producer* is further processing of a product that provides revenue greater than the incremental cost of additional processing and/or further processing that increases sales volume without decreasing the profit margin. *Value-added to the consumer* are products which have an increased “perceived value” (price/quality), provide greater convenience, are easier to prepare, taste good, are healthy, efficiently packaged and have a good storage life.” (Howard 1999)

In most of the producing countries, low labour costs encourage value adding through processing (Fitzsimmons 2000). Several countries have also adopted Hazard Analysis at Critical Control Points (HACCP) procedures that encourage processors to meet high standards and facilitate exports to the US

Most of the fresh tilapia fillets sold in the US are deep-skinned. With so much high-quality fresh product available, new tilapia producers have no choice but to maintain high standards, including starving and purging their fish in algae-free water to prevent

off-flavour. Deep skinning, which reduces fillet yield from about 35% to about 30%, removes the fatty layer, which turns brown after being exposed to air. Tilapia makes an excellent smoked product and Sashimi Grade Tilapia.

Producers in Cuba are working together with customers to exploit the great value adding potential of tilapia. There is specific grading, packaging and ingredient addition expertise on hand. Cuban fillets are free from colorants, preservatives and flavourings. They are low in fat and high in protein. Cuban tilapia can be found in cuisine restaurants, as well as being perfect as a fish supper for a barbecue with friends.

The tilapia allows for the introduction of varied recipes in the kitchen, which diversify the taste in different presentation forms. Products such as breaded, buttered IQF fillets and marinated fillets are found in the market (INDIPES 2001).

4.4 SWOT analysis of the Cuban tilapia industry

SWOT analysis has been pointed out as a simple and potentially useful tool in the strategic marketing planning process (Kotler 1988).

Based on the results of production and marketing phenomena analysed previously, we can assess the strengths, weaknesses, threats and opportunities necessary in order to create a comprehensive marketing strategy.

Strengths

1. Favourable natural conditions for the development of tilapia production, that allow to culture different species with sustainable yield.
2. Modern hatcheries that provide potential for tilapia culture, where the growth of millions of fingerlings takes place under rigorous diseases control.
3. The development of human resources, showed through the permanent qualification, which has allowed obtaining better knowledge to improve production.

Weaknesses

1. High industrial costs of the Cuban tilapia industry that affect the economic efficiency of the production, due to the increase of the value of inputs and maintenance expenses of the freezing process.
2. Insufficient transport equipment for transferring goods (end-products) directly by the industry.
3. Poor communication with end-customers and the use of middlemen often decreases effectiveness in the performance of basic marketing tasks.
4. Lack of promotional marketing activities.

Opportunities

1. Tilapia is a competitor to the traditional whitefish species. The mild flavour, has gained wider consumer acceptance.
2. Exploiting new technologies that allow introducing the new product development processes, e.g.: breaded, buttered and vacuum-packed fillets as “sashimi-quality”.

3. The increase of per capita consumption of tilapia in the US. One of the reasons for the growth in tilapia consumption is the fact that the quality of both fresh and frozen fillets has become much more consistent in recent years. US consumption of tilapia is likely to continue to expand at a rate of 20% per year compared to virtually no increase in overall seafood consumption.
4. The geographical situation of Cuba. Its position (150 km south of Key West, Florida) gives the possibility of establishing a good communication channel to the US market.

Threats

1. The trade embargo by the US
2. The entry of a potential new competitor (bighead carp). The production of bighead carp in the country has reached higher production levels than tilapia, making it the leading specie in the aquaculture sector.
3. Hard competitors in the region of the Americas. Countries such as Ecuador, Costa Rica and Honduras, have maintained a stable supply to the US market.
4. The trend of decreasing price of tilapia.

According to SWOT analysis, in order to establish the Cuban tilapia industry; it should utilise the strengths and opportunities available. Taking advantage of the increase in consumption of tilapia in the US, Cuba will be able to become a source of supply for this, with an increase in its production.

The industry should also pay more attention to the results of production costs, and entail an analysis of the supply sources for their reduction, as well as the technological revision of the freezing installation. Equally, it is necessary to design the promotion of marketing activities.

At present the new potential competitor (bighead carp) on the domestic market has increased. The operation of new technologies in the industry will make it possible to improve products of value added tilapia and to place it as a leader in the domestic market.

4.5 Cuban marketing strategy

4.5.1 Product strategy

Most organisations offering products have multiple items in their portfolio. A *product* is anything that can be offered to a market to satisfy a need (Kotler and Andreasen 1987). In developing a product, the product planner has to distinguish three levels of the concept of a product: the core, tangible and augmented levels.

According to Kotler and Andreasen (1987) these three levels can be defined as follows:

1. Core product: At the most fundamental level stands the core product, which answers the questions: What is the consumer really seeking? and what need is the product really satisfying?
2. Tangible product: The core product is always made available to the buyer in some tangible form. A tangible product can be described as having up to five characteristics:
 - ✓ *Features*: Represents individual components of the tangible product that could be added or subtracted without changing the product's style or quality.
 - ✓ *Styling*: Means giving a product or service a distinctive look or "feel". The style of a product can be established before or after the target market is identified.
 - ✓ *Quality*: Is the perceived level of performance in a product. Products that have a service feature in particular are tremendously variable in quality, depending upon who is providing the service and how much control the organisation exercises over its service providers. A basic issue is how sales response varies with the level of quality in a particular market.
 - ✓ *Packaging*: Packaging is the container or wrapper surrounding the specific product or service. In the case of a service is a contribution of the larger context in which the product is found.
 - ✓ *Branding*: Most products are branded, that is, given a name, term, sign, symbol, design, or some combination of these, which identifies them as the marketer's and differentiates them from competitors' offerings. Branding can also benefit the user, helping the user recognise a product, know its quality in advance, and so on.
3. Augmented product: The marketer can offer to the target market additional services and benefits that go beyond the tangible product, thereby producing an augmented product".

Tilapia is a product that has gained wide consumer acceptance. The Cuban tilapia is fundamentally a good product which fits well into the Caribbean and European white fish market. It is an excellent substitute for traditional fish, which is demonstrated by the rapid increase in consumption in the US (4.2.1 b).

According to Table 11, the price of tilapia has been increasing in the Cuban domestic market and that indicates that the demand for tilapia has increased because of population growth and health-related considerations. Tilapia is a product that the Cuban industry can offer. It has health, nutrition, safety and convenience.

✓ Health image

Consumers in general perceive fresh fish products as healthier and superior to frozen products, e.g. Ecuador exported to the US 50% of all the fresh fillets that entered that market in 2000 (4.1.3). Aspects related to flesh colour, flavour, aroma and nutritional facts are also considered.

- a. Flesh colour: Consumers prefer white-fleshed fish. Tilapia flesh is light grey to white depending on the variety cultured. Tilapia may have colour and flesh qualities that enhance its marketability (Fitzsimmons 2000).
- b. Flavour and aroma: Gustatory quality is also important. Taste tests have demonstrated that tilapia does not absorb off-flavour from animal manure, but they do absorb off-flavours produced by certain blue-green algae and other micro-organisms (CIP 1999). Bleeding the live fish before processing will also reduce off-flavours.

✓ Variety

Tilapia is available in any of these general forms: whole gutted (fresh and frozen), fillets (skinless and boned sides of the fish away from the backbone- chilled, fresh or frozen) and portions (smaller pieces of fish cut from fillets- fresh or frozen).

Farm-raised tilapia may come in a variety of prepared forms including: breaded, buttered and marinated. Tilapia is available packed only of the following manners: ice pack (ice and fresh tilapia in a box) and IQF fillet (water-glazed and individually flash-frozen).

✓ Safety

In 1994, the Food and Drug Administration (FDA) mandated a Hazard Analysis Critical Control Points (HACCP) regulatory system for the food industry to prevent food safety problems before they occur. This system, which places the responsibility for product safety on individual manufacturers and distributors, was nothing new to the farm-raised tilapia industry. For nearly a decade, the industry has been independently executing its own quality control programme.

A basic issue is how sales response varies with the level of quality in a particular market. Figures 16 A and B show a relationship between sales and quality levels according to the results obtained in 4.3.3.

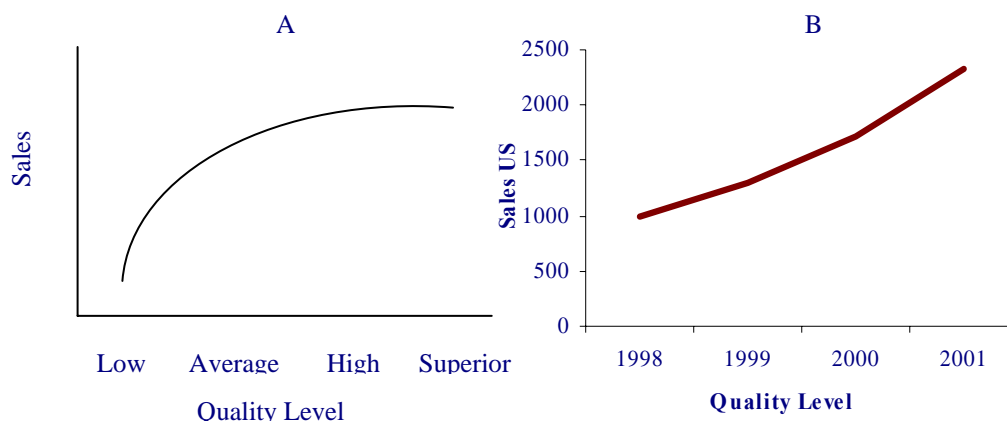


Figure 16: Quality level strategies (Kotler and Andreasean 1987).

Curve A shows that higher perceived quality leads to higher sales. When the relation with B is established, we can observe that the tendency is to increase. Therefore, if the tilapia industry achieves good quality levels, sales will increase. In the future, in order to obtain better results, the industry should continue to improve the quality of the product.

✓ Convenience

Tilapia sales are tending towards value added convenience buying (4.3.4). The interest in providing easier to prepare, good tasting, healthy, efficiently packaged and good storage life products has been well demonstrated. With emphasis on ready to eat products, tilapia is becoming a popular food in the market.

4.5.2 Pricing strategy

For many organisations price is potentially the most controllable and flexible element of the marketing mix. The first thing an organisation must decide in developing a price or pricing policy is the objectives that it wants to achieve. Often the objectives are in conflict, and a choice must be made (Kotler and Andreasen 1987).

In setting a price either for a new or modified product, or for an existing product which is being introduced into a new sector of the market, the strategist needs to give explicit considerations to a variety of factors, such as: an organisation's corporate objectives, the firm's product range, the nature and structure of competition, the product life cycle, legal considerations, consumers and their response patterns and costs.

Taken into account the above, the analysis of a pricing strategy for Cuban tilapia, will focus on discussing the objectives and dimensions of the competition. It could be a reference for the industry and exporters.

At present, Cuba is in a good position to enter new markets because tilapia production has increased. Therefore, the position of their competitors needs to be analysed.

In deciding *how* to price, the strategist has a choice between a ranges of techniques which, for our purposes, can be seen to be broadly either cost oriented or market oriented. This is illustrated diagrammatically in Figure 17.

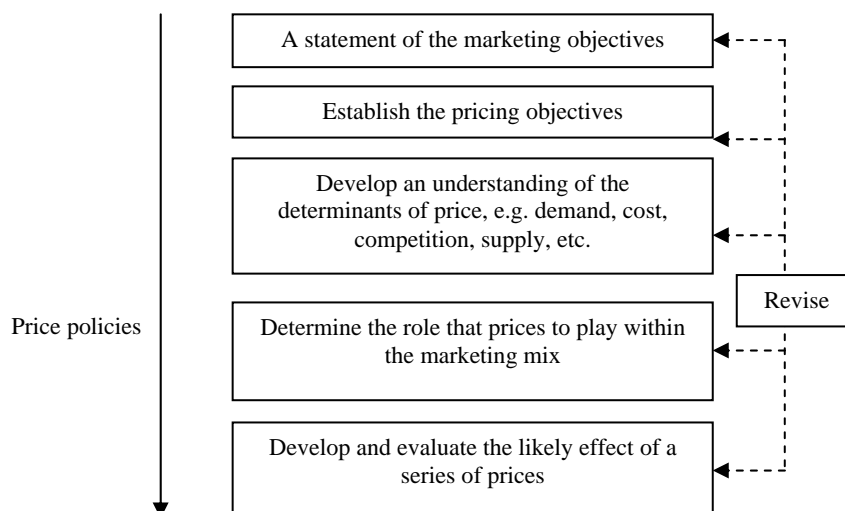


Figure 17: Framework for systematic pricing decisions (Wilson and Gilligan 1997).

After the organisation has defined its pricing objective, it can consider the appropriate strategy for setting a specific price (Kotler and Andreasen 1987). Pricing strategies tend to be: cost-oriented, demand-oriented, or competition-oriented.

1. Cost-oriented pricing: Refers to setting prices largely on the basis of costs, either marginal cost or total cost including overhead. When all organisations in the industry use this pricing approach, their prices are similar if their costs and mark-ups are similar.
2. Demand-oriented pricing: Looks at the condition of demand rather than the level of costs to set the price. Demand-oriented sellers estimate how much value buyers see in the market offer, and price accordingly.

A common form of demand-oriented pricing is *skimming pricing* when high prices are charged for a new product or service when it is first introduced. For price discrimination to work, certain conditions must exist:

- The market must be segmentable and the segments must show different intensities of demand.
 - There should be no chance that the members of the segment paying the lower price could turn around and resell the product to the segment paying the higher price.
 - There should be little chance that competitors will undersell the firm in the segment being charged the higher price.
3. Competition-oriented pricing: When an organisation sets its prices chiefly on the basis of what its competitors are charging, its pricing policy can be described as competition-oriented.

The most popular type of competition-oriented pricing occurs when an organisation tries to keep its price at the average level charged by the industry. This is called *going-rate* or *imitative pricing* and primarily characterises pricing practice in homogeneous product or service markets. It is popular for two reasons:

- a) Where costs are difficult to measure, it is felt that the going price represents the collective wisdom of the industry concerning the price that would yield a fair return.
- b) The difficulty of knowing how buyers and competitors would react to price differentials.

Cost-oriented pricing and demand-oriented pricing are not the best pricing strategies for Cuba. The production cost of the industry is high and there isn't a wide segmentation of the market that shows different intensities of demand.

In order to penetrate into a new market, Cuba could choose the competition-oriented pricing strategy. Tilapia from American and Asian countries is entering the US market with products that have established a market price (4.2.2b and 4.2.4b). Cuba will be penetrating the market, encouraging market growth by a low price/high volume policy. Developing the company's image is another strategy to consider.

In addition, it is necessary to identify competitive products in order to determine the target position. Competitive products have similar features, functions and target customers.

Main features: Tilapia is a cichlid that has a long dorsal and pectoral fin. The head is bright metallic and can reach 37 cm in length. The fish has many attributes suited to domestication and culture. These include good flesh quality and flavour, a wide tolerance of different environments and resistance to many fish diseases.

Functions and target customers: The medium and big sizes of tilapia are usually prepared in restaurants, catering and barbecue. Supermarket and retail chains prefer small and medium sized tilapia. The product is prepared in different forms, such as broiled, gutted and baked tilapia fillet. It is firm and mild.

4.5.3 *Distribution strategy*

Marketing channels, the place element of the marketing mix, are “sets of interdependent organisations involved in the process of making a product or service available for use or consumption” (Belch and Belch 2001).

Channel decisions involve selecting, managing and motivating intermediaries such as wholesalers, distributors, brokers and retailers that help a firm make a product or service available to customers.

A company can choose not to use any channel intermediaries and sell to its customers through *direct channels*. This type of channel arrangement is sometimes used in the consumer market by firms using direct-selling programmes and by manufacturers of industrial products and services, which are often selling expensive and complex products that require extensive negotiations and sales efforts, as well as service and follow-up calls after the sale (Belch and Belch 2001).

Most consumer product companies distribute through *indirect channels*, usually using a network of wholesalers (institutions that sell to other resellers) and/or retailers (which sell primarily to the final consumer). This channel is common in Cuba, which includes some intermediaries. According to Figure 13, when the distribution is through the processor-exporter-export market, better results are obtained.

4.5.4 Promotion strategy

Various techniques can be used to promote sales. They can be categorised as shown below (Wilson and Gilligan 1997):

“Consumer incentives take a wide variety of forms which seem to increase each year as more ideas are created. Some of the more well known of these are: price markdowns, premium offers, banded packs, free sample or tasting offers, prize competitions, personality promotions, in-store demonstrations, and other.

Dealer incentives normally include cash bonuses, credit terms and staff incentives.

Sales force incentives usually take the form of cash payments or prizes for the achievement of specific promotional objectives.

Exhibitions are widely used in industrial, commercial and consumer goods and services markets as a means of promoting sales.

Packaging related to protection of contents, consumer convenience, trade appeal and consumer sales appeal.

Character merchandising including the use of characters such as ‘Mr Men’ can greatly enhance sales of items like mugs and T-shirts to children. Manufacturers pay a royalty and/or a fee for the privilege to the owners of the copyright of the character.

Sponsorship has increased greatly in recent years, and databanks exist which record the companies’ active in this form of promotion and the types of sponsorship in which they are involved”.

Every company is inevitably cast into the role of a communicator or promoter (Kotler 1980). Therefore, the industry must know how to market itself to various groups in order to get their confidence and good will.

The marketing communications mix consists of the subset of marketing tools that are primarily communicational in nature (Kotler 1980). They are the tools normally classified under promotion and include various forms of advertising, packaging, sales-presentations and demonstrations, point-of purchase displays, sales aids, incentive tools and publicity programmes.

The promotional activities of the Cuban tilapia industry are based on exhibitions and in-store demonstrations. In this study will be focus on advertising and publicity programmes.

1. Advertising: One of the major tools of direct marketing is persuasive communication targeting buyers and the public. It consists of non-personal forms of communication conducted through paid media under clear sponsorship (Kotler 1980). More specifically, the purpose of advertising is to enhance potential buyers’ response to the organisation and its offerings.

A clear message is important for companies whose products and services are targeted at mass consumer markets. From the Cuban industry point of view, tilapia products mean quality and competitiveness, convenience, freshness, good service and sales because it has social responsibility and recognition to stimulate demand. Besides, it is able to attract consumers’ attention and can help generate sales.

- What media should be used?

Once the advertising budget is set for a given market segment, region and time period, the next step is to allocate this budget across media categories and vehicles. The selection of a target segment inevitably leads to the use of the medium to which the segment is most frequently exposed (Kotler and Andreasen 1987).

In order of advertising volume, they are newspapers, television, direct mail, radio and magazines. On the basis of these characteristics, the marketer has to decide how to allocate the given budget to the major media categories. In Cuba 'Tips' and 'OPCIONES' are professional magazines that reflect the aim of the professional target group with monthly issues. It is distributed around the country with financial, commercial and tourist purpose to exporters, companies, wholesalers, supermarkets, and foreigners.

2. **Publicity:** Publicity is used to promote various brands, products, persons, places, ideas, activities, organisations, and even nations. Publicity is commonly used in the launching of new products. Publicity is part of a larger concept, that of public relations.

Kotler (1980) established the following functions:

- a) *Press relations:* Is to place newsworthy information into the news media to attract attention to a person, product or service. The Ministry of Fisheries of Cuba cooperates with 'OPCIONES', a Cuban magazine, where the progressive development of the fisheries and aquaculture industry is introduced. The success of marketing and production activities, histories and news articles are identified in order to attract the attention of organisations or persons.
- b) *Product publicity:* Involves various efforts to publicise through new media and other means specific products and happenings related to products.
- c) *Corporate communications:* This activity covers internal and external communications to give attention and understanding to the institution. The Cuban tourist chain (shopping centre, supermarkets and restaurants) in cooperation with the wholesalers and exporting companies develops exhibitions of fishing products, which offer information about the market to the end consumers.
- d) *Lobbying:* Refers to the effort to deal with legislators and government officials to defeat unwanted legislation and regulations and/or to promote wanted legislation and regulations.

Methods described by Kotler (1980) such as: the affordable method, percentage of sales, competitive parity and the objective and task method, will allow each industry or company to determine what to spend in promotional activities.

4.5.5 *Main tasks, objectives and action plan*

The objectives and tasks establish how to carry out the strategy in terms of the all elements of the marketing mix: product, price, place and promotion. In order to improve the export market of tilapia in Cuba the following tasks and objectives are set out (Table 12).

Table 12: Main tasks and objectives of the Cuban tilapia industry.

4 P'S	TASKS	OBJECTIVES
Product	Improvement of packaging mainly for big size fillets.	Total production of big sizes, including portion.
Place	To develop closer relationships between all members within the marketing channel.	To develop strategies to increase benefits and reduce costs of participation.
Promotion	To develop advertising and publicity activities.	To obtain high recognition. To stimulate sales of goods and service. To set decisions about the target market.
Price	Setting the pricing strategy based on competition-oriented pricing.	To enhance the pricing strategy. To penetrate the target market.

Action plan

The action plan states how to implement the marketing strategy in order to obtain the target objectives. The target objectives are stated based on all element of the marketing mix.

1. Product

a) External evaluation/cooperation.

The industry will work on improving the packaging of the product. This should be done in cooperation with external companies specialised in this line. The development of new designs and initiatives will constitute a key element to strengthen the image of the product. This task must be immediately executed; the one responsible will be the Manager of Production and Marketing/Sales Director.

b) Internal Cooperation.

In coordination with the National Aquaculture Centre "Mampostón" in Havana, the industry will continue the capacity building programme at all levels of the industry, in aquaculture, processing and quality management. This programme will be developed twice a year and the one responsible will be the General Director of the company.

2. Price

Setting the pricing strategy based on competition-oriented pricing, analysing the strengths and opportunities of international markets. In 2003-2004 this task must be analysed by the division of accounts and finance and the Marketing/Sales Director.

3. Place

To re-evaluate in detail the probable effectiveness of each strategy for each target group in the marketing channel. Specialised personnel supervised by the General Director must be in place to develop this task in 2003.

4. Promotion

To develop incentive programmes to promote increased production based on advertising and publicity. This task is to be completed immediately by the Marketing/Sales Director and General Director

- ✓ Advertise in magazines, newspapers and television.
- ✓ Participate in exhibitions, demonstrations, etc.

5 DISCUSSION

Imports of tilapia to the US market continue to increase, with total imports over the first half of 2002 at almost 31,780 tonnes, up 22% from the same period in 2001 (4.2.1c). The main reason for the growth in tilapia consumption is the consistent high quality of both fresh and frozen fillets in recent years and that the fish are relatively easy to buy.

Growth of the live market has slowed in recent years. Traditional ethnic market demands are in Los Angeles, San Diego, San Francisco, Vancouver, Houston, New Orleans and New York. Additional markets must be developed.

Overall tilapia imports to the US averaged at \$2.55/kg in the first half of 2002. To some extent, future tilapia prices will depend on price developments of competing products. However, prices are expected to drop further as production increases.

It seems that tilapia has not reached its upper limits of consumption in the US. According to the analysis in Table 4 (in section 4.2.1a), the growth rate of tilapia imports to the US is high in many states (about 102.5% in 3 years); therefore, market opportunities for tilapia in the US should be relatively high at least for the immediate future.

The Latin American countries that supply the US market with tilapia are in the process of expansion, both in volume and quality of the product. In the analysis in 4.2.4b, we can see that the main product import from Latin American countries to the US is fresh fillets. In 2000 97% of total imports were fresh fillets, only a small quantity of frozen fillets (2.54%) and frozen whole tilapia (0.55%) entered to the market in that year.

Countries such as Ecuador, Panama and Jamaica obtained higher prices for fresh fillets than other Latin American countries. According to National Marine Fisheries Service, Fisheries Statistics and Economic Division. Tilapia Imports and Exports 2001-2002 when examining the annual imports of tilapia products through all US customs districts in the year 2000, fresh fillets from Ecuador received higher prices in California (USD 7.06/kg) than in Florida (USD 6.70/kg). The difference shows that Ecuador does not receive the same price for the same kind of product anywhere in the US. Therefore, I assume that there can be differences in price of fresh fillets, depending on where it is sold in the US. Equally, Panama and Jamaica receive different a price in Florida for their products compared to the price that Ecuador receives in Florida.

At the same time, frozen whole tilapia received a higher price than frozen fillets as can be seen in Table 9. I assume that this difference in price is in the quantity and the place where they have been sold. It could also be that consumers like whole tilapia better than frozen fillets, therefore the market can take a higher price for whole tilapia.

Tilapia species require warm water >23°C for growth and commercial production. This farming is only possible using a warm water source or heated recirculation systems, which limits the specific development of culturing these species in European countries. However, in the last years there has been a growing interest in Europe. It

may be necessary to promote tilapia generically with consumers and wholesalers, because consumer awareness of tilapia is low.

The overall SWOT analysis summary of Cuban tilapia export is shown in the next table.

Table 13: SWOT analysis of the Cuban tilapia industry.

<i>STRENGTHS</i>	<i>WEAKNESSES</i>
<ol style="list-style-type: none"> 1. Modern hatcheries. 2. Favourable natural conditions 3. Developed human resources. 	<ol style="list-style-type: none"> 1. High production cost the Cuban tilapia industry. 2. Insufficient transport equipment. 3. Poor communication with end-customers. 4. Lack of promotional activities.
<i>OPPORTUNITIES</i>	<i>THREATS</i>
<ol style="list-style-type: none"> 1. Tilapia is a competitor to the traditional whitefish species. 2. Opening to exploit new technologies. 3. Increase of consumption per capita of tilapia in the US market. 4. Geographic situation of Cuba. 	<ol style="list-style-type: none"> 1. Trade embargo by the US 2. Entry of potential new competitors (bighead carp) in the Cuban domestic market. 3. Hard competitors in the region of the Americas. 4. Trend of decreasing price of tilapia.

According to SWOT analysis, the Cuban tilapia industry should utilise the strengths and opportunities, taking advantage of the growth in tilapia consumption in the US market and to utilise the favourable natural conditions for the development of tilapia production. The industry should also pay more attention to the results of production costs. In order to establish an image of the product the Cuban tilapia industry needs to design promotional marketing activities.

Channels of distribution, once selected and established, involve a relatively long-term commitment to other organisations, such as wholesalers and retailers. It is important therefore to ensure that each alternative is carefully evaluated. For future development of market relation for Cuban tilapia it is necessary to strengthen communication between processors and final customers, in order to make it easier for the processor to be flexible towards the final consumers' needs and ideas about the product.

In this study advertising and publicity were considered as representative tools of a promotional strategy. Advertising is used to persuade target buyers while publicity has the same function with higher credibility caused by an objective approach. Promotional goals should be formulated in order to implement the objectives and tasks.

A competition-oriented pricing strategy allows the industry to penetrate the market with a low price/high volume policy.

6 CONCLUSIONS

1. The main emerging market for tilapia is the US. The results obtained indicate that Cuban tilapia can be introduced to the US market. The main reasons are:
 - ✓ In the last 10 years tilapia imports have increased steadily; tilapia consumption has risen faster than even the most optimistic forecasts predicted. The consumers prefer healthy, safe and convenient products.
 - ✓ The main tilapia products include fillets (typically graded into 113-170 and 142-198 g), whole tilapia (greater than 450 g) and portions. The fillets can be sold as fresh or frozen skinless and boneless. Whole tilapia is sold fresh and frozen.
 - ✓ Asian countries such as Thailand and Indonesia have specialised in the production and export of frozen fillets, becoming the main suppliers and China is the leading supplier of whole tilapia.
 - ✓ The fresh fillet segment has grown fastest in the last few years and has been supplied by Ecuador, Costa Rica, Honduras and Jamaica. The price of fresh fillets is on average \$0.75/kg, higher than of frozen fillets.
 - ✓ About 50% of the imports to the US are frozen whole tilapia mainly from Asia. The quality is variable, which has led to continuing lowering of prices through the years.
 - ✓ Overall, tilapia imports to the US averaged at \$2.55/kg in the first half of 2002.
 - ✓ The key to successful penetration of the US market by Cuban tilapia producers is to maintain the quality of the product (flavour, firmness of the flesh, shelf life), presentation and supply.
2. The market for tilapia is expected to develop rapidly in Europe during the next few years and tilapia will take a market share from traditional whitefish species.
3. Cuba could increase its production and lower its production costs by looking for cheaper sources of supply (feed and packaging). Joint venture with existing marketing entities to operate tilapia farms, as well as modern equipment for processing to obtain products of high quality, are also required.
4. The SWOT analysis shows a good position for Cuba with many opportunities, including favourable geographic location, stable portfolio of prices and the consumption growth in the US. However, Cuba will have to reduce production costs in order to ensure increased revenues to the industry.
5. The marketing strategy should be one of selective distribution, which involves less communication effort than intensive distribution. The channels are:
 - ✓ Processor- wholesaler- retail- exporter- export market- final customer.
 - ✓ Processor- wholesaler- exporter- export market- final customer.
 - ✓ Processor- exporter- export market- final customer.
6. Marketing communication represents the most visible face of the organisation, therefore, the development of advertising and publicity as promotional activities, will help to define the market positioning.

7. To conduct a study of the system of distribution of tilapia within the US market that allows knowing the movement of the product in different channels.

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