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Yellowfin Tuna in the Market for High Value Agricultural Products: Competitive Capability in Dominica

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Abstract

In the last decade, there have been significant changes in the economic focus in Dominica, particularly with respect to changes in trade access for key agricultural commodities. This study examined opportunities for exporting yellowfin tuna (Thunnus albacares) from Dominica. The fisheries sector is identified as an under-exploited resource of Dominica, having significant capacity for foreign exchange earnings, evidenced by an increasing trend in yellowfin tuna harvest, and attractive prices on both domestic and international markets for this product. The study assessed the historical and current trade in yellowfin tuna and reviewed the prospects of the market for high-valued agricultural products. Finally, this study reviewed Dominica's ability to meet existing and proposed marketing and trade requirements, as well as the institutional and other factors that are in place, and those needed to provide continued support to increasing trade of this commodity.

Keywords: yellowfin tuna, high-value product, competitiveness, fisheries, Dominica.

INTRODUCTION

The trade of High-value agricultural products (HVAPs) is viewed as an important strategy for increasing the incomes of small-scale farmers and fishers in developing countries. These commodities are characterized by their (typical) perishability, sale through specialized markets, and product prices that are highly sensitive to variations in quality. HVAPs are inclusive of livestock, dairy, fish, fruits, vegetables and spice products, and

may assist in the diversification process in that they command premium prices.

Fishery products may be classified as "high-value" on the bases of price premium, as well as trade through specialized markets. Of particular interest is the pelagic fish species, of which the yellowfin tuna is a primary target. Trade of yellowfin tuna represents a potentially lucrative market for low-income fishermen in Dominica, as will also contribute to agricultural diversification following the decline in banana production as a primary revenue source.

Increasing global demand for fish and fish products has generated attractive prices for yellowfin tuna in international markets. International price of yellowfin tuna is mainly influenced by shortages in market supply and the price of close substitutes such as bigeye (*Thunnus obesus)*, bluefin (*Thunnus thynnus)* and skipjack tuna (*Katsuwonus pelamis)*. However, in the major international trading markets, there is an observed increase in wholesale prices for yellowfin tuna. In Japan, for instance, the average wholesale premium for fresh yellowfin can be as much as 40% over frozen yellowfin tuna (NOAA-NMFS, 2006). Yellowfin tuna is increasingly being consumed in a fresh state for use in the food service industry and several minor value-added processing activities. The evidence of growth in demand presents an attractive opportunity for low-income farmers and fishermen in Dominica.

Another key factor is diversification. Dominica possesses few natural resources, and so logic purports a focus on products commanding higher per-unit price. Also, given the agro-ecological limitations (e.g. availability of land), horizontal diversification away from traditional export commodities and into opportunities for HVAPs in export markets presents an ideal alternative. Fishery products offer great scope for economic diversification, offering higher per-unit returns which may encourage needed investment.

Poverty reduction is a third driving force behind the export of yellowfin tuna. The livelihood of the majority of the world's poor is in agriculture and it is expected to remain so through to at least 2035 (IFAD, 2001). Poverty in Dominica is estimated at 30% (World Fact Book, 2006). HVAP's may prove a significant aid in improving income-earning capability. Davis (2005) notes two critical factors important to pragmatic evaluation: (i) the degree to which poor farmers/producers are able to participate in the production of the HVAP; and (ii) the degree to which specialized inputs for the commodity/industry use poor household labour (and other non-tradable inputs) which suggests benefits where high levels of employment are possible.

This paper, therefore, seeks to examine export competitive capability of trade of fresh yellowfin tuna in an international market for HVAP's. The analysis of international competitiveness targets the US Miami market. As a result, the Miami market possesses qualities that render the

analyses to be appropriately employed, especially since it is a major fishery entry point into the United States. Also, Miami is the closest international market in North America, and serves as a hub for further dissemination of produce to more northern markets. Further, Miami has excellent provision for market access via the Caribbean Basin Initiative (CBI) infrastructure, and already existing trade relations with the West Indies.

BACKGROUND

International Trade in Yellowfin Tuna

Global production of yellowfin tuna is currently estimated at 1.3 million tonnes (FAOstat, 2007). Landings of yellowfin tuna were second in terms of volume and popularity to the skipjack (*Katsuwonus pelamis*), representing about 35% of global tuna catch (or 1.1 million tonnes) in 2004 (FAO, 2004).

The major producers of yellowfin tuna are Mexico, Indonesia, Philippines, Spain, Venezuela and Japan (Figure 1). The major import markets for yellowfin tuna include the United States, Canada, Japan and Spain (aTuna, 2005). International export is primarily from developing to developed countries, with trade from developed countries representing a relatively smaller proportion. The Atlantic (inclusive of Caribbean harvests) was estimated to contribute 15% of total yellowfin tuna catch by use of purse seining and long-line gear (aTuna, 2004).

Consumption

The key factors influencing consumption (consumer acceptance) of fresh yellowfin tuna in the identified US market are size, capture method, fat content and aesthetic characteristics (Josupeit, 2004). Price is positively correlated to fresh state quality. Accordingly, the trade of high-value fish products such as yellowfin tuna must be cognizant of harvesting and supply chain practices (especially value-adding practices such as product-form preparation and packaging) that may affect the end-quality of the highly perishable product.

There are four basic grade distinctions for the major US and Japan markets. These are: Grade 1 - tuna that have bright red muscle tissue, firm in texture, and have translucent flesh (clarity), and little or no fat; Grade 2 - tuna with red muscle tissue, firm in texture, with some translucency, and no fat. Grade 3 - tuna with some red and brown muscle tissue, firm in texture, with no translucency (opaque), and no fat; and Grade 4 - tuna with brown and gray muscle tissue, soft in texture, and with no transparency.

The USA Market for Fish and Yellowfin Tuna

Fresh fish imports into the United States were valued at USD 166 million in 2006 (UN Comtrade database, 2007). Further examination of the database showed that yellowfin tuna on average represented 13% of total value of fresh fish imports into the United States. Fresh yellowfin

tuna imports represented, on average, 9% of total trade quantity between 2000 and 2005.

Table 1 presents the imports of yellowfin tuna (*HS 1996 030232 – Tuna [yellowfin] fresh or chilled, whole*) into the USA for the period 2001 to 2006. The data shows that the price for fresh yellowfin tuna increased by 25% in the period under review from USD 7.45/kg to USD 9.32/kg. An average annual price increase per kg of 4.58% is indicative of increasing willingness to pay for the product. Comparison to the trade of frozen yellowfin tuna for the period (*HS 1996 030342 – Tuna [yellowfin] frozen, whole*), revealed a price premium for fresh yellowfin tuna, which increased from 8% in 2001 to 14% in 2006.

Moreover, for the USA, Delgado et al. (2003) projected general increases in the consumption of high value fish products based on the dynamics of population and income growth, and the relative attraction of seafood in comparison to other (animal) protein products.

Dominica's Economy and Fisheries Sector

The economic situation in Dominica has become more critical following the World Trade Organization's (WTO) successful veto of preferential trade regulations for banana to the European Union (EU). Economic recession experienced in Dominica within the past five years has generated high levels of poverty (30%), significant unemployment (23%), and low per capita GDP (USD 5,400) (World Fact Book, 2006). Agriculture, however, remains a key economic activity in Dominica, accounting for an estimated 17.67% of GDP and 40% employment of the labour force in 2004 (Dominica CSO, 2006). Therefore, any strategic development effort to advance the Dominican economy should not neglect agriculture, but rather search for alternative opportunities for improving income within the sector.

A premiere opportunity is the market for HVAP's which may contribute significantly to foreign exchange earnings. Fisheries, as one of the least utilized agricultural resources, may yield tremendous economic benefits to the rural and urban poor. Fisheries represented an average of 12% (XCD 9 million) of agriculture's contribution to GDP from 2000 to 2006 (IMF, 2005; IMF 2007), and small-scale fishing has been promoted as a lucrative economic activity for agriculture stakeholders, particularly in the rural milieu where fishing has been an activity providing supplementary income.

The study examines opportunities for exploitation of Dominican stock of the high-value yellowfin tuna using traditional and improved techniques to improve tuna catch, market and economic development.

Profile of Yellowfin Tuna Production and Trade in Dominica

Total landings of yellowfin tuna in Dominica increased significantly between 1990 – 1995 and 2000 – 2005 (Figure 2). The period 1990 – 1995 saw total yellowfin tuna landings

at 123,000 kg; an average of 20,500 kg/year. This figure grew from 2000 – 2005, totaling at 686,000 kg; an average of 114, 333 kg/year being evidence of greater fishing effort and focus on yellowfin tuna.

The significant increase in fishing effort (number of trips) presents a similar finding (Theophille, D. Fisheries Division Dominica [FDD], personal communication). Estimated total number of trips tripled between 2001 and 2005, increasing from 367 to 1, 265 (FDD, 2007a). The normal harvest period is the six month period from August to January. Notwithstanding, the FDD's examinations suggest that local fishermen harvest only a small proportion of the available stock.

For major yellowfin tuna landing sites such as Marigot, Portsmouth and Dublanc, (Figure 3), fishers gut the fish at sea as soon as possible after catching, usually carrying ice for immediate storage. Consequently, there has been an observable increase in the quality of landed yellowfin tuna since 2003 as a result of fishermen's education on better harvest and storage practices.

Quantity increases were experienced through greater use of fish aggregating devices (FAD's). FAD's are widely used by fishermen in Dominica to land larger catches of migratory pelagics (FDD, 2007b). Storage and handling facilities at Fisheries Complexes in Roseau and Marigot contributed to improved quality and presentation of fish, therein enhancing product market appeal (FAO, 2002). Access to ice and cold storage facilities increase fish marketability by prolonging shelf-life and helps reduce wastage.

The local retail price of yellowfin tuna ranged from XCD (Eastern Caribbean dollars) 5 - $7/lb (USD 1.87 – 2.62/lb) (FAO 2002). Yellowfin tuna prices have had little negative change over the years. Prices ranged from XCD 4/lb circa 2000 and have risen to XCD 6-7/lb in 2007. Yellowfin tuna prices at Roseau have been known to reach *ECD 9/lb* at the fish market.

Export Trade

Interest in yellowfin tuna exports were cultivated by the opportunity for foreign exchange earnings, lucrative utilization of surplus from harvests in 2001 and 2002, and to encourage higher earnings by fishermen were the primary drivers for these pilot projects (Defoe, J., FDD, personal communication, 2006). Data available from the UN Comtrade database show exports of fresh yellowfin tuna to Antigua and Barbuda, Montserrat, Canada and the USA between 2003 and 2006. The more substantial exports (2,622 kg) were to the USA in 2005, followed by relatively consistent exports to Montserrat between 2004 and 2006 averaging at 159 kg each year.

Two export ventures are of particular note: the first in 2003 to York Fish Company Limited, Ontario Canada, and the second to Rontel International of Fort Lauderdale Florida. Both ventures, however, were short-lived. For York Fish, problems of inconsistent supply arose, and in the case of Rontel International trade

halted due to claims of poor quality fish (Defoe, J., FDD, personal communication, 2006).

METHOD

The study was aimed at exploring the opportunity for Dominica's entry and competition in the export of fresh yellowfin tuna, and identified Miami as the target market. The study examined competitiveness on the bases of (i) competitive advantages in the domestic market (Competitiveness Factor Conditions using Porter's Diamond Model), and (ii) export cost-competitiveness (using the Nominal Protection Coefficient [NPC] to estimate the degree of protection/buffer for domestic exports).

Porter's Diamond model is an analytical tool that allows for evaluating the competitiveness of a nation, or a firm within a nation (Porter, 1990). The model suggests that the national home base of an organization plays an important role in shaping the extent to which it is likely to achieve advantage on a global scale (competitive advantage), expressed by four indigenous factors: factor conditions, demand conditions, firm strategy, structure and rivalry, and related and supporting industries (Figure 4). In addition, there are two exogenous factors: government and chance (circumstances in a nation that are often largely outside the power of firms), which influence competitiveness. Summary description of the factor components and determination of the importance weights are presented in Appendix 1.

These factors are discussed on the basis of competitive advantage; defined as the identification of positions and sources of advantage (e.g. superior skills) that lead to desired market performance outcomes such as market share and profitability (Promitheas Business Education Centre, 2006). Thus, the approach incorporates real world/ existing trade patterns, including all the barriers to free trade (Worley, 1996).

The analysis incorporated factor components which represent the key areas for each indigenous factor perceived to be of importance to competitiveness. The factor components were determined using empirical data, followed by consultation via a survey with fisheries officers of the FDD who consented to participate in the exercise.

The survey was used to determine which factors, and factor components, were thought of as being most important to competitiveness through a ranking and scoring process. An electronic copy of the survey was sent to these officers, giving a five day period for completion and return. Four fisheries officers who were knowledgeable of the use and availability of yellowfin tuna in Dominica participated. For the indigenous factors, the ranking determined the comparative importance of each in achieving competitive advantage. Each ranked position carried a score: the #1 position carried a score of 10, the #2 position a score of 7.5, #3 a score of 5, and #4 a score of 2.5. The

cumulative ranking points for each factor were used to assign weights, by simply dividing the total score for the factor by the total score of all factors.

For each factor component, fisheries officers scored between 0 - 10 based on the presence (maximum 10) or absence (minimum 0) of capability in the incumbent. A 1 to 10 point scale was chosen since it enabled better expression of perceived absolute importance among the compared elements than a 1 to 5 point scale. The total score for the factor component was the product of the average score for the factor component multiplied by the importance weight for the factor.

The weights represent the relative importance of the factor to competitiveness. Therefore, the factor with the largest weight was considered the most important to international competitiveness and the factor with the lowest weight considered as the least important to international competitiveness. A summary description of the factor components and determination of the importance weights are available in Appendix 1.

The weighted scores represent the *current* significance of the indigenous factor under prevailing conditions. The sum of the Factor scores (FS) are a sum of the factor component scores out of a maximum of 10 points, where the maximum score possible is 10 multiplied by the indigenous factor weight. The total of indigenous factor scores is expressed out of the sum of the *maximum* score possible for the indigenous factors, that is, the cumulative of 10 multiplied by the indigenous factor weight, multiplied by the number of factor components in the incumbent. The result of this calculation is referred to here as the Competitive Advantage Coefficient (CAC):

$$\mathbf{CAC = S\,FS_I \,/\, S\,FS_{MAX}}$$

where,

$\mathbf{S\,FS_I}$ = sum of factor scores for indigenous factors

$\mathbf{S\,FS_{MAX}}$ = sum of maximum scores possible for indigenous factors

The CAC represents the degree to which competitive advantages that may allow the domestic producer to compete effectively in the target export market are harnessed, given the existing market environment/ conditions *ceteris paribus*. Thus, where the CAC = 1, the domestic country is assumed to be harnessing superior competitive advantages with respect to entry and competition in the target market, and given existing conditions, while CAC = 0 would suggest that there are no competitive advantages to support/justify entry and competition in the target market. A CAC as close to or equal to 1 is desired.

Moreover, analysis using weighted scores (such as the CAC) in Porter's Diamond Model is indicative of the extent to which *current* competitive advantages are expressed in the domestic country. Thus, it becomes possible to use the model as a measure of trends in the factors impacting on the competitiveness of a

sector/industry each year based on new initiatives or changes in the export market that may promote/hinder competitiveness.

Export Cost Competitiveness: Tweeten (1992) described the Nominal Protection Coefficient (NPC) as the ratio of the domestic price $\mathbf{P_d}$ of the *i-th* commodity to its border price $\mathbf{P_b}$:

$$\mathbf{NPC_i = P_{di} / P_{bi}}$$

where,

$\mathbf{NPC_i}$ = nominal protection coefficient for the i-th commodity in a given country,

$\mathbf{P_{di}}$ = domestic price of the i-th commodity at the producer or wholesale level,

$\mathbf{P_{bi}}$ = border price of the i-th commodity at the same market location as the domestic price, with the border price being its international trade or world price times the rate of exchange.

This formula may be adjusted to examine the competitiveness of domestic exports within a target foreign market, and is expressed here as the Export Competitiveness Coefficient:

$$\mathbf{ECC_i = P_{di} / P_{ei}}$$

where,

$\mathbf{ECC_i}$ = export competitiveness coefficient for commodity *i*

$\mathbf{P_{di}}$ = domestic export price (fob) for commodity *i* in the foreign market

$\mathbf{P_{ei}}$ = border price (cif) of commodity *i* in the foreign market

In this regard, the ratio of the domestic price (fob) to the border price is indicative of the level of protection/ profit margin that domestic exporters have over the average price of the commodity in the export market. An ECC < 1 represents a positive protection for domestic exports; that is, domestic producers can supply the foreign market at a price less than the international fob price. Conversely, an ECC > 1 is indicative of negative protection where the fob price for domestic exports is higher than the international fob price in the foreign market, and is thus uncompetitive. The assumptions upon which the ECC calculations were made are presented in Box 1.

Box 1: Assumptions used in ECC Calculation	
1. Cost per Landing	Assumes a total cost of USD 218.35 per landing; consisting of 8 yellowfin tuna (assumes fishing as a full-time activity using artisanal vessels, representing a factor increase in average landing over part-time basis. Sources: ICCAT: Yellowfin tuna landings in Dominica and Number of trips: Yellowfin tuna; FDD) each at 44lb (average landing weight; Source:aTuna, 2006)
2. Freight	USD 0.79 for >100 lbs but <1,100 lbs (Source: Amerijet)
3. Packaging	Each box costs USD 30.15 (incl. 15% VAT), and each box holding 2 yellowfin tuna
4. Packing Operations	USD 1.22/box labour (packing) and USD 1.50 (spot check supervision), plus Utilities cost of USD 1.25 (water = ECD 2.92/m3 and electricity = ECD

	0.42/kWh). Each box takes on av. 20 mins. to pack. (Source: personal communication, FDD)
5. Transportation to airport	Cost per trip is USD 26.7, carrying 8 yellowfin tuna (est. minimum capacity). (source: personal communication)
6. Insurance	Insurance is USD10. (Source: Amerijet)
7. Broker's Fee	Broker fee is USD 10 (Source: Amerijet)
8. Port Charges	Port charges comprises: documentation at USD 15; security is USD 10;and Fuel is USD 0.13/lb. (Source: Amerijet)
9. Handling & Transport	Total handling charge is USD 11.44. (Source: Amerijet)
10. Interest	Interest for financing is charged at a rate 10% per annum. (Source: Amerijet)
11. Cold storage cost	Cold storage cost is USD 0.10/lb. Estimated time in cold storage is 3 months maximum. (Source: personal communication)
12. Marketing margin of importer	Marketing margin of importer estimated at 30%. (Source: personal communication)
13. Average fob price in USA	USD 4.23; 2005-2006 av. fob from Trinidad and Tobago (major supplier of fresh yellowfin tuna in 2005-2006; Source: UN Comtrade database)
14.OER	An official exchange rate of ECD 2.67 = USD 1.00.

RESULTS AND DISCUSSION

Feasibility of entering the export trade of yellowfin tuna as a HVAP is examined with respect to the degree to which the survey participants indicate the nation or firm possesses.

Competitive Advantage

Factor Conditions with a weight of 0.30 was perceived to be the most important factor for competitiveness, followed by Relating and supporting institutions with 0.28 (Table 2). Dominica has a CAC of 0.65. The CAC implies that current competitive factors which shape the environment in which domestic producers will compete and promote the creation of competitive advantages is at 65% of the *current* capacity to compete in the target market under existing conditions. The summary findings from Porter's Diamond Model, therefore, identify the most supporting and limiting factor areas with respect to competitiveness for yellowfin tuna exports from Dominica. The major supporting and limiting factors, determined by the total factor score expressed out of the maximum score possible, are now presented:

Supporting Factors

Demand conditions were the most contributive to competitive advantage. This factor of the Porter Diamond Model describes the state of demand for the product or service in the country. Trade data indicates an upward trend in the price/kg for fresh yellowfin tuna imported into the USA. A similar trend is observed in the domestic market, where yellowfin tuna prices remain very attractive. Moreover, according to Porter's rationale, home demand often provides clear and more easily recognized signals of demand trends (Porter, 1990). Yellowfin tuna prices at Roseau have been known to reach *XCD 9/lb* (USD 3.37) in the fish market. Dominica also showed competitive capability for Factor Conditions. This factor in Porter's Diamond Model refers to the situation in a country regarding production factors relevant for competition in the particular industry; capitalizing on

initial advantages. For Dominica, the most contributive characteristics were harvest method and strategies for maintaining product quality.

The dropline harvesting method is suggested to yield better quality fish because it minimizes fish stress in capture (WPFMC, 2006). Also, dropline fishermen are able to hook and quickly land tuna, producing extremely fresh tuna that attract premium prices.

With the dropline, once a fish has "bit the line" it is immediately reeled in. Though a bit more meticulous and requiring more effort, this method may be more desirable than longline nets which, although designed to capture more fish per casting, may bring up fish already dead. Product quality in the targeted market is an important feature for consumer acceptance. Thus, a harvesting method that satisfies market preferences for fresh tuna contributes to a competitively competent position for entering the Miami market and in building product equity.

Limiting Factors

The most limiting factors observed, Related and Supporting Industries, and Firm Strategy, Structure and Rivalry, were unfortunately perceived to be very important to competitiveness in Dominica. The former examines the means by which one internationally successful industry may support advantages for another. These advantages may be seen in the coordination of activities in the value chain for mutual benefit. The major factor components here pertain to the absence of a broker/distributing agent in the target market and distribution channels and comparative benefits in shipments. The absence of market support systems is thought to be directly linked to the low manifested supply capability.

Representation in the target market is limited to one broker from the Dominica Export Import Agency (DEXIA) and the efforts of the FDD. A market representative is essential to facilitating the export venture, as well as safeguarding against fraud (verification of quality and state of the produce at the end market). In addition, it affords the opportunity to gather needed market intelligence to guide operations in the exporting country, as well as ensuring good customer relations. Evidently, given the food safety issues and transparency in business arrangements, proper representation is essential.

Marketing support and market intelligence are thus limited and need to be strengthened. Also, opportunities within the Region should also be explored, given general increased focus on developing tourist and food service institutions. For Dominica, the neighbouring French islands of Martinique and Guadeloupe may offer attractive opportunities. Priority should be given to maintaining product quality through the supply chain and exploring opportunities for coordination/cooperation with other domestic exporting operatives to promote development of beneficial transport networks.

Firm strategy, structure and rivalry examines conditions in the domestic country that determine how companies are established, organized and managed, and help determine the characteristics of domestic competition. The focus here is on competitive advantages that exist locally which may be the bases of advantage in a global market. The number of independent distributors and the influence on rivalry is noted. Productivity becomes less of a focus in a domestic economy where few rivals exist and demand for the product is good, as opposed to an economy with many rivals. Accordingly, it may be deduced that given general reluctance of fishermen to venture into deeper waters to target pelagic fish such as yellowfin tuna (mainly because of small vessel size), less focus is placed on improving the productivity of the trip outside of harvesting a satisfactory number of fish. Communicating price incentives may help stimulate fisher motivation to increase effort put into landing market-desirable catch.

The average annual quantity of yellowfin tuna landed in Dominica was 253,820 lbs between August 2000 to January 2005 (ICCAT, 2006). Together with circuitous factors (e.g. fisherman attitude and willingness to fish or adhere to fishing schedule), the supply capability of Dominica is currently limited. Persisting constraints identified here include: (i) incidence of illegal, unregulated and unreported (IUU) fishing; and (ii) absence of legislation and enforcement to protect fisher welfare and support sustainable fishing practices.

A key component of Dominica's plan to compete internationally rests upon good supply capability. Since available stocks has thus far been estimated to be largely under-utilized, gives advantages for strategic planning and management of commercial utilization, especially on account of diminishing stock of traditional suppliers. However, incidences of IUU fishing, which can account for as much as 30% of available stock, may threaten this aim (Kopetchny, 2006).

Dominica is, however, able to appeal to the FAO Committee on Fisheries (COFI) under the FAO Code of Conduct for Responsible Fisheries citing issues for proper management of fish stocks as under the International Plan of Action against Illegal, Unregulated and Unreported Fisheries (IPOA-IUU); adopted February 2001. Moreover, the regulatory environment should better define initiatives aimed at sustainably managing the exploitation process such as enforcing catch reports for registered fishers, regulation on the number of fishers and species-specific regulations as data becomes more available.

Export Cost Competitiveness

Examination of opportunities for yellowfin tuna in the HVAP market must be cognizant of cost-competitiveness which remains a critical element for obtaining returns that encourage investment/re-investment given the prevailing

competitive environment. The study defines the competitive environment through the ECC which reflects the degree of protection (margin) that domestic producers may be afforded in the export market, given current competitive capability.

The analysis showed an ECC of 0.99 for Dominica, which gives a margin of USD 0.04/lb or 0.95% (Table 3). This implies that the *current* position does not justify pursuit of the export opportunity as the profit margin afforded is unattractive to investment. This statement must be considered in light of the CAC findings which show that Dominica's *present* capacity to compete has a factor of 0.66 of its true capacity. The cost competitive environment is now discussed in greater detail, looking first at production/landing costs, and then exporting costs.

The estimated total cost per landing in Dominica was USD 218.35 (Table 4). Fuel/petrol and crew labour represent the major cost factors, accounting for 60% and 27% of total cost, respectively. Dominica's fishery is artisanal, and is characterized by low/minimal-investment practices (fishing gear, maintenance, etc.), with fishing being supplementary to another occupation (usually farming).

The analysis assumed fishing on a full-time basis using existing gear and vessels, and landing an average of 8 yellowfin tuna per landing, each at 44 lbs (see Box 1). For exports to be competitive in the Miami market, a fob price of USD 3.80/lb is desired based on the historical data for the most price-competitive supplier.

The main export cost item observed was freight (USD 0.79/lb or 21% of export market price). Freight is followed by production cost (USD 0.62/lb or 16%) and port charges (USD 0.20/lb or 5%). At the current scale of operation, the productivity per landing would have to increase to 10 yellowfin tuna per landing to yield a desirable margin of USD 0.39/lb or 10% (ECC = 0.90).

Sensitivity analysis showed that a 10% increase in freight cost (USD 0.87/lb) had the effect of increasing ECC to 1.02, an unfavourable position. The same change was made with a 10% increase in production costs (USD 0.68/lb). A 5% decrease in landing cost (USD 0.59/lb) and freight (USD 0.33/lb) showed improved ECC's of 0.97 and 0.98 respectively. Consequently, a reduction in landing costs may have the more significant impact on competitiveness.

The findings of the ECC analysis show that the present supply capability will not yield benefits justifying exports. The average yield/landing for artisanal -level fishing would have to increase to 10 yellowfin tuna to offer a 10% margin (USD 0.39/lb). Credit services focused at major capital and variable cost factors (e.g. improved vessels and fishing technology) may contribute significantly to improved fishing performance, and also to a reduction in landing costs by making cost-effective equipment more available. Also, a joint venture initiative with another fishing nation may help build supply capability. Joint ventures offer

reduced investment risk, opportunities for building/improving own capacity, as well as yielding new market opportunities; for example, the development of value-added commodities.

CONCLUSION

Presently, Dominica's competency to compete is hinged upon product quality. The dropline harvesting method yields fresh yellowfin tuna that are of desired quality (freshness and appearance criteria) for the international market. Also, given the relatively low traditional exploitation rate of stock, capacity for growth in the scale of operations exists. Dominica may be a long-term competitor in the export trade of yellowfin tuna given the implementation of appropriate management, regulatory and production infrastructure.

Capability to compete, however, is limited by factors such as the absence of support industries and market representation, low levels of investment and low productivity (CAC = 0.66). Moreover, artisanal -scale production, given the existing levels of investment in fishing technology and gear, is not feasible from an exporting point of view (ECC = 0.99). In light of this evidence, emphasis is placed on the following developmental areas *prior* to investment activities in export of YTF or other fishery products from Dominica: developing needed market intelligence, sustainably improving supply capability, developing organized marketing and supply chain support systems, and fishery regulation.

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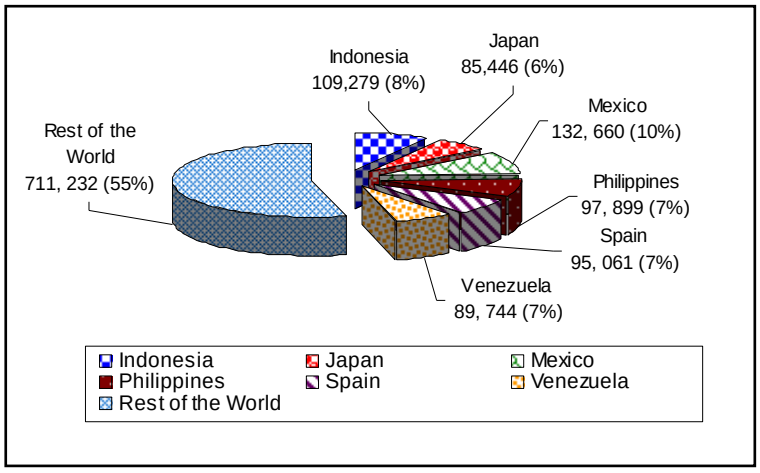

Figure 1: Average Production (Tonnes) and Percentage of Total Production for Major Global Producers of Yellowfin Tuna - (av. 2000 - 2005)

Source: FAOstat, Fisheries and Aquaculture Department, 2006

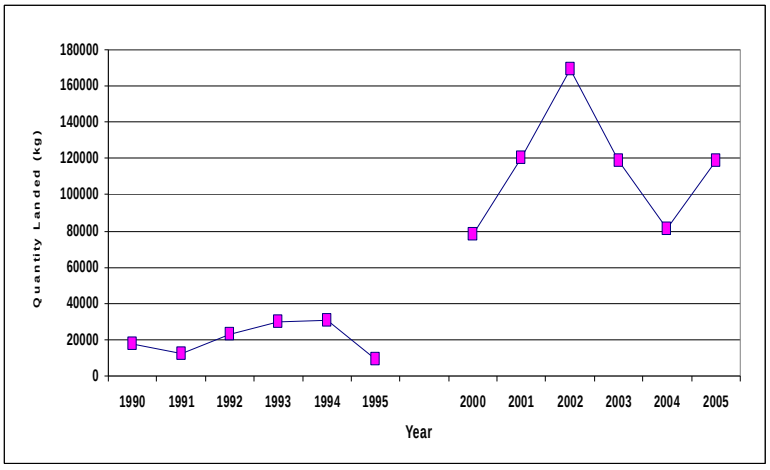

Figure 2: Quantity of Yellowfin Tuna (*Thunnus albacares*) Landed in Dominica (kg) for periods 1990 – 1995 and 2000 - 2005

Source: ICCAT Statistics Department, 2006.

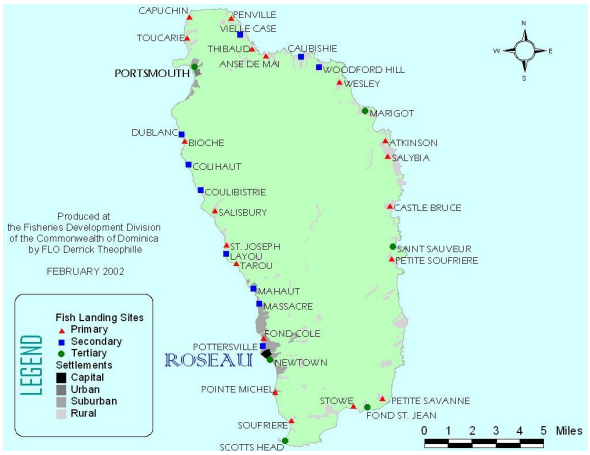

Figure 3: Major Landing Sites in Dominica

Source: Derrick Theophille, Fisheries Division Dominica, 2002

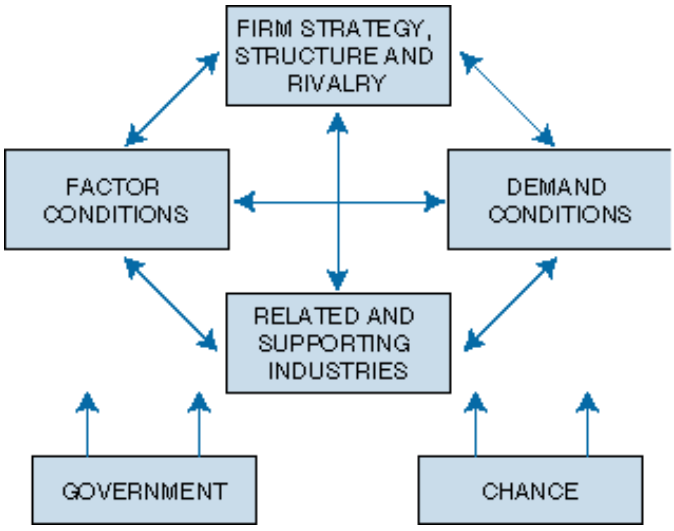

Figure 4: Michael Porter's Diamond Model

Source: Irish Agriculture and Food Development Authority, 2006

Table 1: Imports of Fresh Yellowfin Tuna (HS 1996 030232 – Yellowfin Tuna Fresh/Chilled) into the USA – 2001 to 2006

Year	Trade Value (USD)	Trade Quantity (kg)	Average price/kg (USD)
2001	116,015,587	15,563,939	7.45
2002	126,969,617	15,966,290	7.95
2003	127,125,506	15,299,555	8.31
2004	133,085,782	15,623,995	8.52
2005	154,565,658	17,064,030	9.06
2006	165,782,259	17,791,793	9.32

Source: UN Comtrade database, 2007.

Table 2: Factor Component Description, Weights and Scores Used for Analysis of Competitive Capability in Dominica

FACTOR	FACTOR COMPONENTS	FACTOR COMPONENT DESCRIPTION	FACTOR IMPORTANCE WEIGHT	DOMINICA		
				Av[1]	Score [2]	Max[3]
Factor Conditions	Geographical location	*proximity to the target market (Miami)*	**0.30**	7	2.10	
	Harvesting method	*contribution to fish quality*		9	2.70	
	Level of technology (productivity: cost/landing)	*high or low technology use and productivity derived*		6	1.80	
	Strategies for maintaining product quality (grade)	*Post-harvest storage and handling practices*		7	2.10	
Factor Score					**8.70**	**12.00**
Firm Strategy, Structure and Rivalry	Number of independent distributors and influence on rivalry	*the number of independent local suppliers and influence on rivalry; (many = high rivalry; few= low rivalry)*	**0.23**	5	1.15	

	Supply capability and regulation	*potential yield and year-round availability*		8	1.84	
	Cost productivity	*efficiency of cost per landing*		8	1.84	
Factor Score					**4.83**	**6.90**
Demand Conditions	Local price received and price stability	*average price commanded*		6	1.20	
	International price received (value of export)	*based on product quality*	**0.20**	9	1.80	
Factor Score					**3.00**	**4.00**
Related and Supporting Industries	Agriculture-related export product(s) in target market	*presence of other exporters using similar markets and distribution channels, technology, etc. which build customer awareness of the country or company*		4	1.12	
	Distribution channels and comparative benefits in shipments	*benefits derived from using existing distribution means*	**0.28**	7	1.96	
	Presence of a broker/distributing agent	*presence of a broker/ distributing agent as representative*		4	1.12	
Factor Score					**4.20**	**8.40**
SUM OF FACTOR SCORES FOR INDIGENOUS FACTORS ($S FS_I$)					**20.73**	
SUM OF MAXIMUM SCORES POSSIBLE FOR INDIGENOUS FACTORS ($S FS_{MAX}$)					**31.30**	
COMPETITIVE ADVANTAGE COEFFICIENT (CAC)					**0.66**	

1 = average score from fisheries officers;
2 = average score times factor importance weight.
3 = maximum score possible for factor (i.e. 10 x factor importance weight x number of factor components).

Table 3: Export Competitiveness Coefficient (ECC) for Exports of Yellowfin Tuna from Dominica1

COST ITEM	COST/LB (USD)
1. DOMESTIC PRODUCTION COST	
a. Fisher's production cost (incl. 20% margin)	0.62
b. Fisher's margin (20%)	0.12
c. Packaging box (contains 2 fish/box)	0.34
d. Packing House Operations	0.15
e. Transport to Shipping Port	0.11
f. Broker fee (2% of costs a - e)	0.03
g. Freight	0.79
h. Insurance	0.03
i. Cif at destination port (sum of costs a – h)	2.19
j. Exporter's Selling Price (incl. 25% margin) (j x 1.25)	2.74
2. COST FOR DELIVERY TO TERMINAL MARKET	
k. Broker fee	0.03
l. Port charges	0.20
m. Handling and transport	0.15
n. Cold storage cost	0.10
o. Total handling & other charges (sum of costs k – n)	0.48
l. Importers Cost at Terminal Market (j + o)	3.22
m. Marketing margin of importer (30%)	0.97
n. Total Cost at the Terminal Market (incl. profit) [P_{ei}]	4.19
o. Average fob price to USA (2001 - 2006 average) [P_{di}]	4.23
p. Export Competitiveness Coefficient (n ÷ o)	0.99

1 - Estimates cost for one fisherman and based on assumptions in Box 1 above.

Table 4: Estimated Cost Per Landing for Pelagic (Tuna) in Dominica (USD)

Cost Variable	**Cost per Landing for Pelagic (Tuna) (USD)**
Petrol	131.09
Ice	7.49
Bait	3.75
Food	0.00[#]
Maintenance*	1.87
Gear*	3.00
Engine*	5.62
Boat*	5.62
Crew	59.93
Total cost	**218.35**

* - Cost variables were calculated from an annual figure.
** - Crew cost is $3.15/hr for an average of 16.67 hrs per fishing trip
[#] Food costs are considered irrelevant in both cases
Source: FDD, 2006

APPENDIX 1

Determination of Factor and Factor Component Weights
The tables below summarize the results for the ranking of factors contributing to international competitiveness of yellowfin tuna in Dominica:

A survey was used to determine which factors, and factor components, were thought of as being most important. An electronic copy of the survey was sent to these officers, giving a five day period for completion and return. Four fisheries officers who were knowledgeable of the use and availability of yellowfin tuna in Dominica were targeted. This was done through a simple ranking and scoring process.

For the indigenous factors, the ranking determined the comparative importance of each in achieving competitive advantage. Each ranked position carried a score: the #1 position carried a score of 10, the #2 position a score of 7.5, #3 a score of 5, and #4 a score of 2.5. The cumulative ranking points for each factor were used to assign weights, by simply dividing the total score for the factor by the total score of all factors (Annex Table 1).

Annex Table 1. Weighted Importance (as contributing to international competitiveness) of Factors in the Diamond Model

Factor	Fisheries Officer Rankings [A]				Total Score Assigned	Weighted Importance [B]
	A	B	C	D		
Factor Conditions	3	2	2	1	30	0.30
Firm Strategy, Structure and Rivalry	4	3	1	3	22.5	0.23
Demand Conditions	2	4	2	4	20	0.20
Related and Supporting Industries	1	1	4	3	27.5	0.28
					100	1.00

A: #1 – 10 points; #2 – 7.5 ponts; #3 – 5 points; #4 – 2.5 points
B: = Factor total score assigned/ Total Scores

As seen in table 4 above, the order of factor importance, as contributing to international competitiveness is as follows: factor conditions (0.30), related and supporting industries

(0.28); firm, strategy, structure and rivalry (0.23); and demand conditions (0.20). For the factors studied, the greater the weight, the greater the perceived significance to international competitiveness.

Annex Table 2 shows the weighted values for the factor components used in the analysis. For each factor component, fisheries officers of the FDD rated the component between 0 – 10 based on the presence (maximum 10) or absence (minimum 0) of capability in the incumbent. A 1 to 10 point scale was chosen since it enabled better expression of perceived absolute importance among the compared elements than a 1 to 5 point scale. The total score for the factor component was the product of the average score for the factor component multiplied by the importance weight for the indigenous factor to which it corresponds. For example, Geographical location has a weight of 2.03 which is the product of the average score (7) times the importance weight for Factor conditions, 0.30.

Annex Table 2. Factor Component Scores and Weights

Factor	Factor Component	Fisheries Officer Scores				Average Score $_A$	Weight $_B$
		A	B	C	D		
Factor Conditions	Geographical location	9	5	5	8	7	2.03
	Harvesting method	10	10	7.5	7	9	2.59
	Level of technology (productivity: cost/landing)	7	7	5	5	6	1.80
	Strategies for maintaining product quality (grade)	8	10	7.5	3	7	2.14
Average Sum							
Firm Strategy, Structure and Rivalry	Number of independent distributors and influence on rivalry	0	8	1	9	5	1.01
	Supply capability and regulation	10	10	4	9	8	1.86
	Cost productivity	9	10	5	6	8	1.69
Average Sum							
Demand Conditions	Local price received and price stability	5	6	7	7	6	1.25
	International price received (value of export)	10	9	9	7	9	1.75
Average Sum							
Related and Supporting Industries	Agriculture-related export product(s) in target market	6	6	4	4	4	1.10
	Distribution channels and comparative benefits in shipments	8	5	6	8	7	1.86
	Presence of a broker/distributing agent	10	6	0	0	4	1.10
Average Sum							

B = A × Factor weighted importance (Annex Table 1