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## **Shrimp Aquaculture in Colombia**

Final Report for  
Microeconomics of Competitiveness

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## **Overview**

This project has been developed as part of the Microeconomics of Competitiveness' Country and Cluster framework to understand the opportunities and challenges of Colombia and its Shrimp Aquaculture Cluster. An initial overview of the country's history, economics, and competitiveness will be provided, followed by a focused section on the Shrimp farming cluster. Finally, the paper will conclude with useful and actionable recommendations for the government and private sector to increase country and cluster competitiveness.

## **Country Analysis**

Colombia is Latin America's third largest country by population with 44 million inhabitants. It is the 6th largest economy in the region, and its area is the size of France, Spain, and Portugal together. It is a country with access to two oceans, proximity to the US and Europe, and a vast quantity of natural resources. However, in spite of being Latin America's oldest and longest standing democracy, Colombia is a country that has been tainted by political and social instability. Colombians have been victims of a long internal sociopolitical conflict for over 40 years; the longest in the history of the modern world.

### *Political context:*

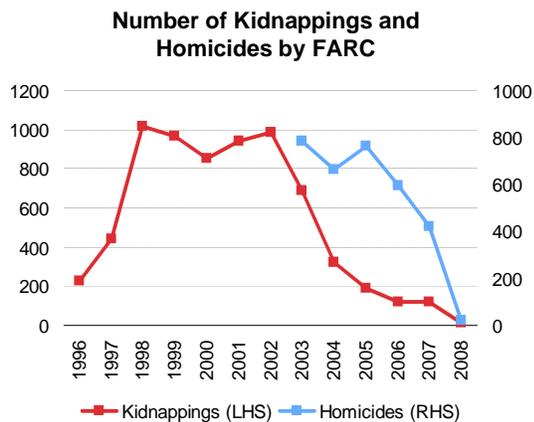
After more than forty years struggling with an internal conflict involving leftist guerillas, paramilitary groups, and state forces, ignited by the money of illegal drugs trafficking, the country finds itself for the first time envisioning the potential prospects of a post-conflict era.

The arrival of President Uribe to office in 2002 and the implementation of his "Democratic Security" policy have been pivotal to arrive to this stage. After a flawed attempt at undertaking a peace process with the FARC under the past administration (President Andres Pastrana), Uribe got to power with the mandate of increasing military action against any insurgent group with the purpose of recovering full control of the country for the State. In

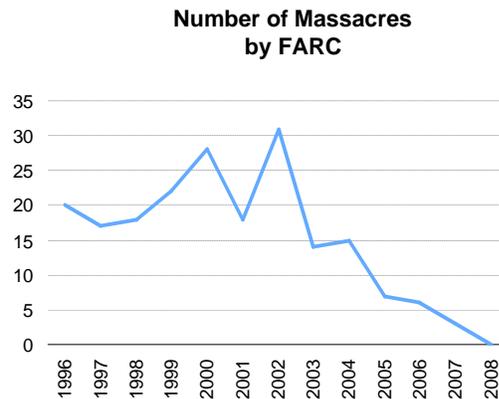
addition, his strategy also involved the creation of legal frameworks that would allow the demobilization of any insurgent groups, either from the guerrilla or paramilitary groups.

Evidence shows that Uribe’s “Democratic Security” policy has been quite successful. The number of kidnappings and homicides, as well as the number of massacres by FARC, has substantially declined (see figures 1 & 2).

**Figure 1.**



**Figure 2.**



Source: Fondelibertad. Observatorio del Programa Presidencial de DH y DIH, Vicepresidencia de la República. 2008

*Better security, higher growth:*

Although there are many factors that might be constraining Colombia’s economic growth potential -such as corruption, weak infrastructure, or low human capital- security and political instability had become its most binding constraint. However, it has been widely demonstrated that its binding constraint is the security and political situation. Colombia’s unstable political circumstances and lacking security deterred foreign investors from coming to the country, curtailed investments in areas with low security, and diminished confidence of entrepreneurs, all of which led to higher risks and lower asset values.

While this is Colombia’s largest weakness, the more recent improvement of the security situation and debilitation of the armed actors have led to recently more prosperous times in the

Colombian economy. GDP increased 7.52%<sup>1</sup> last year and was among the highest rates in the region. Investment rates as a percentage of GDP have also increased in Colombia, from 12% in 1999 to almost 25% in 2006<sup>2</sup>. Increased investment has led to increased productivity of the labor force, where Colombia's GDP per employee is growing more and is higher than most of its Latin American peers and close to some Asian role models.

The new government has also increased the effectiveness of Colombian institutions, which according to the Kaufmann Governance Indicators<sup>3</sup> have been improving since 2000. These strong institutions have been critical to maintain a stable macroeconomic environment (inflation, current account balance, and interest rates), which in turn have brought increased confidence in the economy.

Benefiting from a strong political capital, the government has also been able to undertake important reforms. It passed a long needed pension reform, streamlined some of the procedures in the judiciary system, and privatized several large and inefficient SOE's in the utilities and healthcare sectors. Furthermore, to continue to grow the economy, the government is in the process of signing free trade agreements with the US, the EU, and other key countries.

*Room for improvement:*

Following the significant strides in the security, investment, institutional, and macroeconomic fronts, Colombia and the government has currently the conditions to orient its policies towards improving competitiveness and social development.

In terms of innovation, Colombia is lagging with respect to its peers, with moderate growth in patent output and levels well below its peers like Brazil or Mexico<sup>4</sup>. Innovation is a key component of sustained growth and cluster development and should be looked at carefully from a public policy perspective.

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<sup>1</sup> DANE. [www.dane.gov.co](http://www.dane.gov.co)

<sup>2</sup> Banco de la República. [www.banrep.gov.co](http://www.banrep.gov.co)

<sup>3</sup> World Bank, Worldwide Governance Indicators, 1996-2006. <http://info.worldbank.org/governance/wgi2007/>

<sup>4</sup> Porter, M. (2007). Colombian Competitiveness: Moving to the Next Level. Harvard Business School.

In terms of social indicators, Colombia has indeed reduced its poverty levels in the last decade. Furthermore, unemployment has gone down from 19.4% in 1999 to 11.1% in 2008<sup>5</sup>. Despite these improvements, income distribution as measured by the GINI coefficient is among the highest in Latin America. Therefore, Colombia should continue to address the social progress of its population as a means to smooth its transition towards a developed economy.

#### *Inside Colombia's clusters*

The composition of Colombia's economy shows how it is increasingly making a transition from an agrarian economy to a more industrial economy (agricultural share of GDP decreased from 20% in 1999 to 12% in 2007<sup>6</sup>). This transition is due partly to a stagnating agricultural sector hurt by the security situation in rural areas, as well as to the increased presence of manufacturing activities in the country.

In terms of clusters, Colombia is a fairly typical Latin American Economy, with the largest clusters being mining, agriculture and oil. Unfortunately, none of the Colombian clusters commands a dominating share of world markets. Furthermore, the country is losing ground in some clusters of increased value add, like communications and biopharmaceuticals. Other clusters are gaining share, but not in a very aggressive manner (see figure 3).

It is therefore important for Colombia to look into its competitiveness as a country and improve some of the conditions that are constraining cluster development overall. The country has made great progress on the security front and the economy has responded very favorably. However, in order to sustain that growth, issues like competitiveness, innovation, and social equilibrium need to be addressed.

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<sup>5</sup> Economic Commission for Latin America and the Caribbean. CEPAL statistics.

<http://websie.eclac.cl/sisgen/ConsultaIntegrada.asp>

<sup>6</sup> CIA World Factbook. <https://www.cia.gov/library/publications/the-world-factbook/geos/co.html>



strengths within each of the other four categories of factor conditions (physical infrastructure, human resources, technology infrastructure, and capital markets). Specifically, Colombia's main advantages are in the quality of its management schools, the cooperation in labor-employer relations, the air transport infrastructure, and the sophistication of the financial markets. Other elements of potential leverage for the country include Colombia's abundant arable land (50.7 million hectares<sup>9</sup>) and its vast biodiversity (Colombia has the largest number of amphibious species in the World, and among the largest variety of palm trees)<sup>10</sup>.

The most striking disadvantages within the factor conditions are in infrastructure. Colombia is considered in rankings such as the BCI to have relatively weak roads, ports, and railroads infrastructure<sup>11</sup>. The country also lacks scientific research institutions and scientists, availability of engineers, innovation (patents), and access to venture capital and financial credit. These areas seem to be strongly related, indicating an opportunity to address them through an integrated approach.

#### *Demand conditions:*

As in the majority of the parts of the diamond, in demand conditions, Colombia is relatively competitive in general regulations, but not as much in actual procedures and actions. In particular, Colombia has high rankings in the BCI (relative to its overall score) in indicators such as presence of demanding regulatory standards and stringency of environmental regulations. On the other hand, the actual demand practices rank weakly. This is the case for government procurement of technological products and buyer sophistication. The latter, however, is gradually progressing, especially considering Colombia's outstanding economic growth in recent years.

#### *Firm strategy and rivalry:*

The main problems for the competitiveness of Colombia in the last forty years have been its internal conflict and drug trafficking. As explained in the previous section, these issues have

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<sup>9</sup> DANE, 2003

<sup>10</sup> Yo Creo en Colombia. [www.yocreoencolombia.com](http://www.yocreoencolombia.com)

<sup>11</sup> World Economic Forum (2007). "Business Competitiveness Index 2007-2008".

recently improved and, hence, investment in the country has increased. However, Colombia is still perceived by many outsiders as an unsafe place to do business, which is undermining the potential investment in the country. As security improves in Colombia, the policies for development ought to progress from a focus on the conflict to building the competitiveness of the country. The results of the improvement need to be promoted to outside investors, as Colombia is yet to be on the radar of multinationals deciding where to locate the next operation. Another weakness is that Colombia is relatively fragile in terms of property rights, actual intensity of competition, and trade tariffs. According to the Doing Business Report of the World Bank (2007), the main concerns for Colombia, in addition to the trade tariffs and the access to credit also identified in the BCI, are the high corporate taxes and cumbersome procedures to submit tax information, and the weakness of contract enforcement. From the World Bank's Enterprise Surveys (2006), companies perceive the anti-competitive practices related to informality as the major obstacle for their growth.

On the positive side, Colombia's competitiveness in the rivalry component of the diamond is based on the strength of its regulations, which seek to implement generally accepted best practices. That is the case for corporate governance regulation, intellectual property protection, and, to a smaller extent, its anti-trust policy<sup>12</sup>. In addition, Colombia is well positioned vis-à-vis other countries in Latin America in the procedures to start and close a business, and to deal with licenses, in the protection of investors, and in employing workers.<sup>13</sup> Colombia is determined to reform its weaknesses and prepare itself for a future of growing investment.

Zooming to the regional level and analyzing the business conditions in Cartagena, the most important city for our cluster, we can observe that the city is not well ranked within the country. Specifically, out of the 13 cities in Colombia examined by the World Bank's Doing

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<sup>12</sup> World Economic Forum (2007). "Business Competitiveness Index 2007-2008".

<sup>13</sup> World Bank (2007). "Doing Business Report".

Business Report (2008), Cartagena ranks twelfth overall and the lowest in property rights. It is also in the last quartile in contract enforcement, taxes, and procedures to start a business. The only area where Cartagena is well positioned within the country (first out of thirteen) is in the conditions to trade across borders, which reflects its Caribbean coast location.

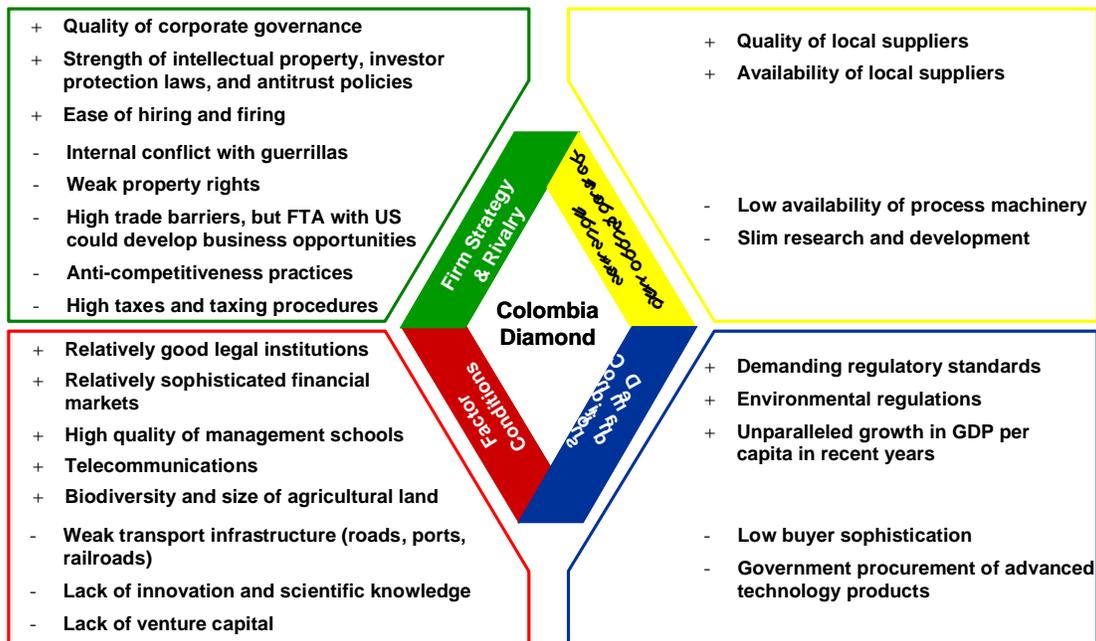
*Related and supporting industries:*

In the last part of the diamond, the related and supporting industries, Colombia has sought to develop the interaction across businesses and currently is relatively well positioned in the quality and quantity of its local suppliers. These conditions are particularly valuable to provide depth for cluster development. On the other hand, as explored in the factor inputs, Colombia lacks a broad research and development infrastructure, potentially undermining its capacity to expand in a number of industries. This disadvantage is exposed in the low ranking of the country in the local availability of specialized research and training services, and of process machinery<sup>14</sup>.

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<sup>14</sup> World Economic Forum (2007). “Business Competitiveness Index 2007-2008”.

**Figure 4. Colombia's Country Diamond**



### The World Shrimp Market

World production of shrimp has increased more than five times since the 1970s, reaching record breaking levels of almost 3.5 million tons in 2005. This production growth of 8% CAGR from 1990 to 2005 has been driven largely by shrimp aquaculture, which has grown at 23% CAGR in that same time period. Aquaculture has become even more significant in recent years because of high oil prices which have increased the cost of trawling, a fuel intensive fishing activity necessary for shrimp capturing. In 2005, shrimp aquaculture accounted for 52% of global production.<sup>15</sup>

The largest world exporters of shrimp are developing countries: Thailand, China, Vietnam, and India. Colombia ranks 20<sup>th</sup> in the world. Shrimp exporters are fragmented, with no single country holding more than 14% share of exports, and only 6 countries holding more than 5% share. Shrimp importers, on the other hand, are moderately concentrated. The largest

<sup>15</sup> FAO 2008.

importers are all developed countries, with USA (25% share), Japan (14% share), Spain (7% share), and Denmark (6% share) taking the lead in 2005.<sup>16</sup>

The price of shrimp is volatile, as is common for agricultural commodities whose supply is tied to variations in climatic conditions and patterns of disease outbreaks. Over the last decade, the world price of shrimp has been declining, due to a fast growth in global shrimp production (driven in large part by technological advances in disease control for aquaculture), which has outpaced the growth in global demand. This downward trend in prices is expected to continue in the coming years.<sup>17</sup>

Although all exporters are facing this negative price trend, shrimp products can be differentiated to an extent, and thus command different price points, based mainly on the product's size (count per kilogram), degree of processing and presentation, source/origin, and species.<sup>18</sup> There is great variation amongst import markets regarding preferred shrimp specifications. The European market, for example, places a premium on whole (HOSO – head on shell on) shrimp, whereas the US market prefers the other presentations (like SO – shell on and PTO – peeled tail on).<sup>19</sup> Shrimp can also be exported fresh, canned, frozen in a block, or frozen individually (through a process called Individually Quick-Freezing). Figures 5 and 6 show sample premiums placed in the US market for different types of shrimp preparation and countries of origin.

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<sup>16</sup> UN Data, A world of information. <http://data.un.org>

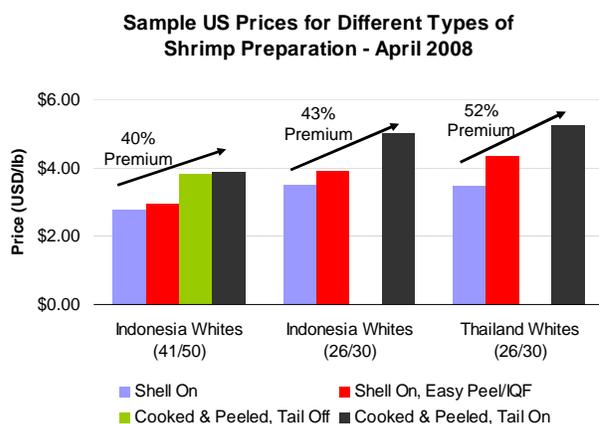
<sup>17</sup> FAO 2007 Food Outlook. <http://www.fao.org/docrep/010/ah876e/ah876e10.htm>

<sup>18</sup> Food Market Exchange.

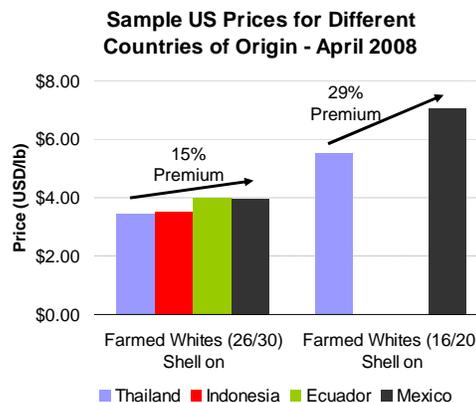
[http://www.foodmarketexchange.com/datacenter/product/seafood/shrimp/detail/dc\\_pi\\_sf\\_shrimp0501\\_01.htm](http://www.foodmarketexchange.com/datacenter/product/seafood/shrimp/detail/dc_pi_sf_shrimp0501_01.htm)

<sup>19</sup> Wikipedia, Shrimp Marketing. [http://en.wikipedia.org/wiki/Shrimp\\_marketing](http://en.wikipedia.org/wiki/Shrimp_marketing)

**Figure 5.**



**Figure 6.**



Source: Shrimp News International. <http://www.shrimpnews.com/Prices.html>

Trade policy is also key to understanding shrimp trade. Import tariffs are significant in countries in the European Union, ranging from 2% to 20% depending on the country and the type of shrimp product. USA and Japan, on the other hand, have reduced their import tariffs to basically 0% in the USA and 1.8% to 6% in Japan in 2006.

More important barriers in the USA are anti-dumping tariffs. In 2003 an anti-dumping investigation was started on shrimp produced in Brazil, Ecuador, India, Thailand, China, and Vietnam. The US Department of Commerce concluded that the US shrimp industry was “materially injured by imports of non-canned shrimp and prawns from the countries listed.”<sup>20</sup> Today, these six countries face anti-dumping tariffs ranging from as low as 2% for Ecuador to as high as 93% for Vietnam.<sup>21</sup>

In addition to tariffs, another important trade barrier is the stringent sanitary and phytosanitary measures imposed on shrimp products (causing increased testing and the detention of shrimp with high levels of antibiotics residue in the EU, for example). Furthermore, the future may very well hold increased requirements on environmental and social issues, which could have an important impact on the industry.<sup>22</sup>

<sup>20</sup> USDA Foreign Agricultural Service [http://www.fas.usda.gov/ffpd/Newsroom/Articles/shrimp\\_imports.asp](http://www.fas.usda.gov/ffpd/Newsroom/Articles/shrimp_imports.asp)

<sup>21</sup> Josupeit, H. (2006). “Regulations in Shrimp Trade”. <http://www.globefish.org/index.php?id=3222>

<sup>22</sup> Josupeit, H. (2006). “Regulations in Shrimp Trade”. <http://www.globefish.org/index.php?id=3222>

## Cluster Analysis

### *Cluster History, Evolution, and Importance:*

Shrimp farming was first identified as an activity of high potential for Colombia in 1982. The government and select business leaders saw this not only as a way to increase employment and exports, but also as a way to utilize abandoned regions of the country that were not adequate for other forms of agricultural activity. Shrimp farming started in Colombia's Caribbean Coast in 1983, and it was included in Colombia's National Exports Plan (*Plan Nacional de Exportaciones*) of 1984-1990.<sup>23</sup>

The government put certain measures in place to promote the development of shrimp and other forms of aquaculture, along with the development of other industries. Some of these incentives included:

- Favorable credits from the Export Promotion Fund
- Certificates of Tributary Reimbursements
- Resources destined to export promotion
- Legislation sought to facilitate use of national and private saline and low lands
- Incentives for re-investment into new agricultural activities, including tax discounts of up to 35%<sup>24</sup>

Aggressive forecasts and the unexpected drop in world shrimp prices initially yielded unfavorable economic results for the industry (especially given expectations of quick returns and high margins), which only started becoming profitable in 1989. In 1993, a research institution for aquaculture, Ceniagua (*Centro de Investigación de la Acuicultura de Colombia*), was formed with public and private support. Its goal was to develop research activities that would spur the sector's technical development, and to improve the levels of productivity, quality control, and disease prevention.<sup>25</sup>

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<sup>23</sup> Aguilera, M. (1998). "Los cultivos de camarones en la Costa Caribe colombiana".

<sup>24</sup> Aguilera, M. (1998). "Los cultivos de camarones en la Costa Caribe colombiana".

<sup>25</sup> Aguilera, M. (1998). "Los cultivos de camarones en la Costa Caribe colombiana".

Only a year later, Colombia's shrimp farms had increased productivity to three times the productivity of Ecuador, one of the world's global leaders at the time.<sup>26</sup> At the end of the year, however, the Taura Syndrome virus, which wiped out many competitors throughout the Americas and later in many South-East Asian regions,<sup>27</sup> affected production negatively and increased costs. The White Spot Syndrome (which leads to up to 100% mortality rates in some types of cultured shrimp)<sup>28</sup> was also causing havoc in Asia (leading to the 1993 virtual collapse of the Chinese shrimp farming industry) and was spreading to the Americas.<sup>29</sup>

Shrimp aquaculture producers went to the government for support in 1995, and in 1996 they became the first agricultural sector to develop a Competitiveness Agreement (*Acuerdo de Competitividad*) with the government. This agreement included the allocation of resources and co-financing of Ceniagua to improve the resistance of shrimp to the Taura virus as well as to White Spot syndrome (WSS) and other existing diseases.<sup>30</sup> In 1998 and 1999, WSS had spread to Central and South America, severely affecting shrimp production for producers everywhere, including producers in Colombia's Pacific Coast. Environmental conditions in Colombia's Atlantic Coast, however, greatly reduced the probability of incubation and spread of this disease, and shrimp production actually increased in the Atlantic Coast during this period.

Investments in Ceniagua paid off through increases in productivity, which will be discussed later in the paper. In 2004, Colombia was the 9<sup>th</sup> largest producer in the world of farmed shrimp, with its farmed shrimp production increasing 17% CAGR from 1996 to 2004.<sup>31</sup> In 2005, 92% of Colombia's shrimp was produced through aquaculture.<sup>32</sup> Today, more than 95% of shrimp is exported to the USA, Japan, and Europe (mainly Spain, Italy and France).<sup>33</sup> The volume of shrimp exports has increased 4.5% CAGR from 1992 to 2005, although the value

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<sup>26</sup> Aguilera, M. (1998). "Los cultivos de camarones en la Costa Caribe colombiana".

<sup>27</sup> Wikipedia: Taura Syndrome. [http://en.wikipedia.org/wiki/Taura\\_syndrome](http://en.wikipedia.org/wiki/Taura_syndrome)

<sup>28</sup> Wikipedia: White Spot Syndrome. [http://en.wikipedia.org/wiki/White\\_spot\\_syndrome](http://en.wikipedia.org/wiki/White_spot_syndrome)

<sup>29</sup> Wikipedia: White Spot Syndrome. [http://en.wikipedia.org/wiki/White\\_spot\\_syndrome](http://en.wikipedia.org/wiki/White_spot_syndrome)

<sup>30</sup> Aguilera, M. (1998). "Los cultivos de camarones en la Costa Caribe colombiana".

<sup>31</sup> FAO 2008.

<sup>32</sup> FAO 2008.

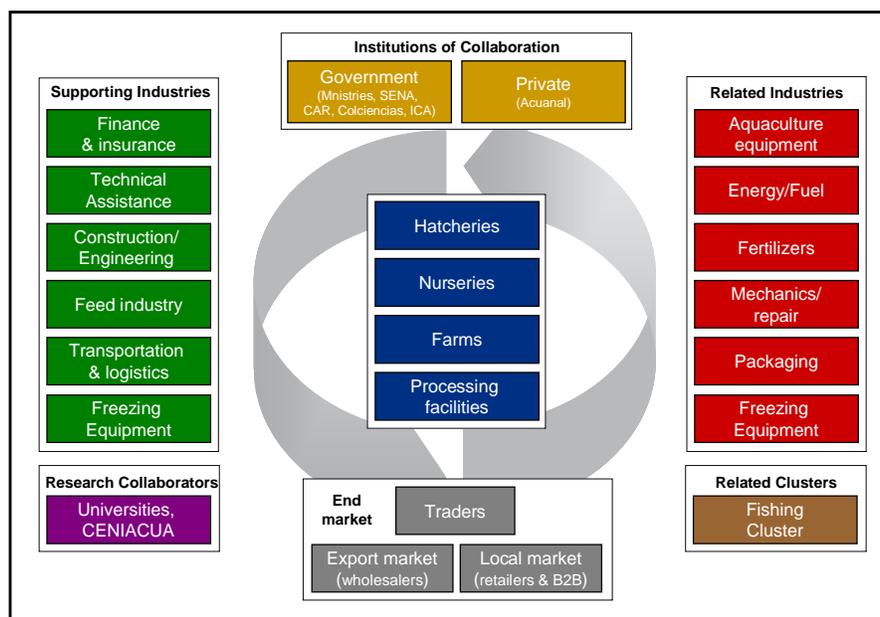
<sup>33</sup> FAO. "Fishery & Aquaculture Country Profile: Colombia"

of these exports only increased by 0.9% CAGR during this same time period given the decrease in world prices.<sup>34</sup>

Shrimp farming is of great importance to Colombia economically and socially. While shrimp exports represent less than 1% of the total value of exports, they represent almost 50% of the value of exports created by the entire fish and fishery sector.<sup>35</sup> This activity also generated over 15,000 direct and indirect jobs in 2003<sup>36</sup>, and spurred the development of public and social infrastructure (such as schools, housing, health and social centers, micro-enterprises) in poor, depressed, and remote areas that did not have any other options for the productive use of this land.<sup>37</sup>

After 25 years, the shrimp aquaculture cluster has deepened greatly. The core of the cluster, which takes shrimp from the seed stage through its harvesting and processing, is embedded in a cluster environment rich with related and supporting industries, public and private institutions for collaboration, research collaborators, traders, and end market partners.

**Figure 7. Shrimp Aquaculture Cluster Map**



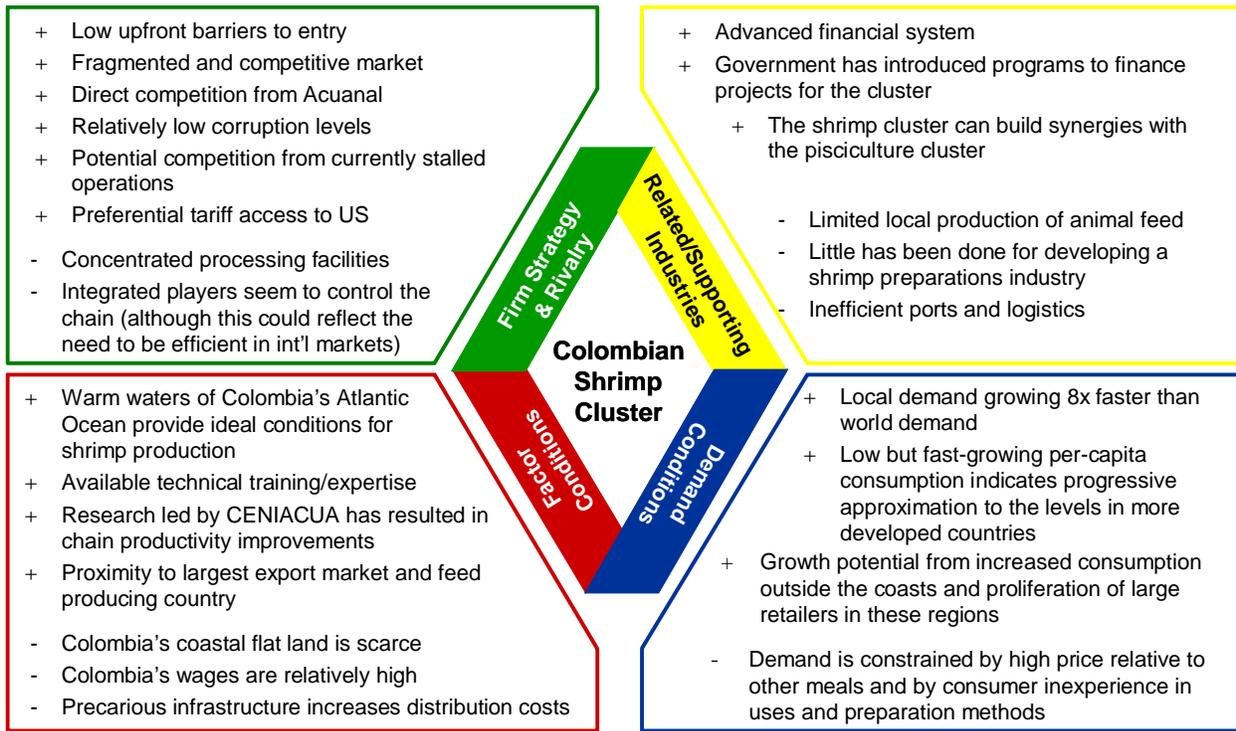
<sup>34</sup> UN Data, A world of information. <http://data.un.org>

<sup>35</sup> INCODER. Pesca y Acuicultura Colombia 2006. Corporación Colombia Internacional.

<sup>36</sup> Agrocadenas. (2006) La Cadena del Camaron de Cultivo en Colombia – 1991-2005.

<sup>37</sup> Acuerdo Sectorial de Competitividad para la Cadena de Camarón de Cultivo.

**Figure 8. Colombian Shrimp Cluster Diamond**



**Factor Conditions:**

Four factor conditions improve the cluster's competitiveness. First, Colombia's Atlantic Ocean provides ideal conditions for shrimp production. Its warm waters positively influence shrimp's metabolism and growth and reduce the probability of diseases, bacterium and seaweeds. Second, Colombia's proximity to the largest export market (US) and feed producing country (Peru) reduces transaction costs. Third, relevant technical training is well developed in Colombia. Marine biologists from Jorge Tadeo's University, for example, helped develop the shrimp cluster in Cartagena. Finally, technical research led by Ceniagua explains significant improvements in shrimp farming productivity (see table 1 below). Its main achievements include developing disease resistant shrimp breed stocks (resulting in improved immunity to Taura and White Spot syndromes and increased larvae survival rates); decreased duration of shrimp production cycle; and, increased productivity of reproductive females.

**Table 1. Productivity Indicators**

	Colombia	Brasil	Ecuador	China	Vietnam	Tailandia	Average
Cycle duration (days)	115	151	146	150	150	150	144
Farming density (larvae per square meter)	24	46	15	24	24	24	26
Food conversion (kg food per kg shrimp produced)	2	2	1	2	2	2	2
Survival (number of shrimps over total of larvae per ha %)	1	1	0	1	NA	0	1

Source: Colombian Ministry of Agriculture (2006)

However, the cluster also faces three conditions that limit its competitiveness. First, shrimp is produced in flat coastal lands, which are now relatively scarce in Colombia. A percentage of these suitable lands were established as “indigenous communal land,” making its purchase difficult, and another important percentage is used in cattle farming, making land prices too high for the industry.<sup>38</sup> Second, Colombia’s labor costs are higher than other producing countries. Labor represents a significant portion of total production cost and the country has the second most expensive manual/ junior clerical labor force relative to its main competitors (see table 2 below). Finally, precarious infrastructure increases distribution costs. These infrastructure deficiencies have traditionally been linked to security problems, Colombia’s challenging topography, and fiscal constraints.

**Table 2. Average wages main shrimp producers**

US\$/year	Brazil	Mexico	Colombia	Ecuador	Thailand	China	Indonesia	Vietnam
Top management 2	785,015	566,022	293,268	176,083	110,169	98,870	69,969	26,264
Middle management	202,695	207,794	147,267	115,867	45,202	62,543	46,403	22,229
Senior sales	204,819	229,995	147,267	128,274	51,099	59,855	52,278	24,850
Professional / administration / junior management	58,017	48,341	46,644	31,209	21,131	27,338	17,985	11,199
Sales	64,278	60,031	48,104	35,800	25,603	26,864	19,694	12,474
Clerical / technicians	19,446	13,733	16,435	11,215	9,398	12,748	7,130	5,014
Manual / junior clerical	10,527	8,561	9,682	n.a.	5,475	n.a.	3,564	3,169
EIU productivity adjustment, US=1	[0.20]	[0.28]	[0.21]	[0.16]	[0.17]	[0.13]	[0.10]	[0.07]

Source: The Economist Intelligence Unit. 2008.

**Key Challenges:** Flat coastal lands for shrimp produced are scarce in Colombia; Colombia’s labor costs are higher than other producing countries; Precarious infrastructure significantly increases distribution costs.

<sup>38</sup> Expert interview.

## **Firm strategy and rivalry**

### *Incentives:*

As it is the case in other exporting countries, the restrictions to start shrimp aquaculture in Colombia are relatively small, as these activities have limited regulation<sup>39</sup>. Although the constraints to invest have always been limited, government's financial incentives were initially important for cluster development. In fact, the shrimp industry has benefited since 1985 from the financial support of the government through subsidized loan interest rates, tax discounts and anticipated tax refunds. The government assistance contributed for the development of farms in the Atlantic and Pacific coasts, although some of them have since then closed operations due to the growing diseases and the decline in shrimp prices. In the last 10-15 years, the government has reduced considerably the importance of aquaculture-specific financial incentives, as the banking sector started replacing the state as a resource for the industry. It is only in the last three to five years, as explored in more detail in the following section, that the government has introduced incentives again, but this time they are general for the agriculture and fishing sectors and not specific to aquaculture.

In fact, since the mid-1990s, the government has been more focused on supporting the sector by building research and development programs, as demonstrated by their contribution for the funding of Ceniagua. This organization has created two research institutes, one in the Pacific coast and one in the Atlantic, and has crafted a genetics-based program with two main objectives: develop the best brooders to be turned into post-larvae to be used by all Colombian farms, and improve the selection process in order to increase the size of the shrimp and its resistance to diseases. In this latter program, Ceniagua received the technical assistance of the Akvaforsk Institute from Norway, which was fundamental to genetically improve the effectiveness of

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<sup>39</sup> Gautier, Dominique. (2002). "The adoption of good management practices by the shrimp industry on the Caribbean coast of Colombia". World Bank, NACA, WWF, FAO.

shrimp production in Colombia<sup>40</sup>. This focus on shrimp resistance may have, however, a double-edge sword effect on competitiveness. Although Colombia clearly gains from its capacity to increase shrimp survivorship, it may lose competitiveness after introducing regulation that controls imports and transport of marine organisms from one coast to another. This legislation for sanitary purposes can, in effect, reduce the competition that local Caribbean firms face from its Pacific counterparts. Nonetheless, the net effect of these control measures should be positive for the long-term competitiveness of the shrimp industry in international markets.

Furthermore, Ceniagua is part of Acuanual, the association of aquaculture producers in Colombia, and the main Institute for collaboration (IFC) in the industry. Acuanual seeks to foster alliances between the private and the public sector, as well as lobby for policies to improve the competitiveness of its members.

Within the incentives for industry development, it is worth also mentioning that the workforce receives relatively good benefits for participating in shrimp aquaculture. For example, employees are generally given special benefits, including access to healthcare, paid vacations, and participation in a retirement savings program. Additional benefits provided by some of the companies include bonuses, training and education, and food subsidies.

#### *Competition:*

In regards to the level of competition, the shrimp industry in Colombia is relatively fragmented across the main stages of the value chain.<sup>41</sup> As shown in figure 9,<sup>42</sup> there are less than a dozen companies in hatcheries, the early stage segment where nauplii are produced, but the main three players control over 50% of the market. Ceniagua is one of these main hatcheries, and its goal is to provide the companies in the following stages of the supply chain with local quality inputs. Ceniagua, thus, limits predatory pricing at this stage.

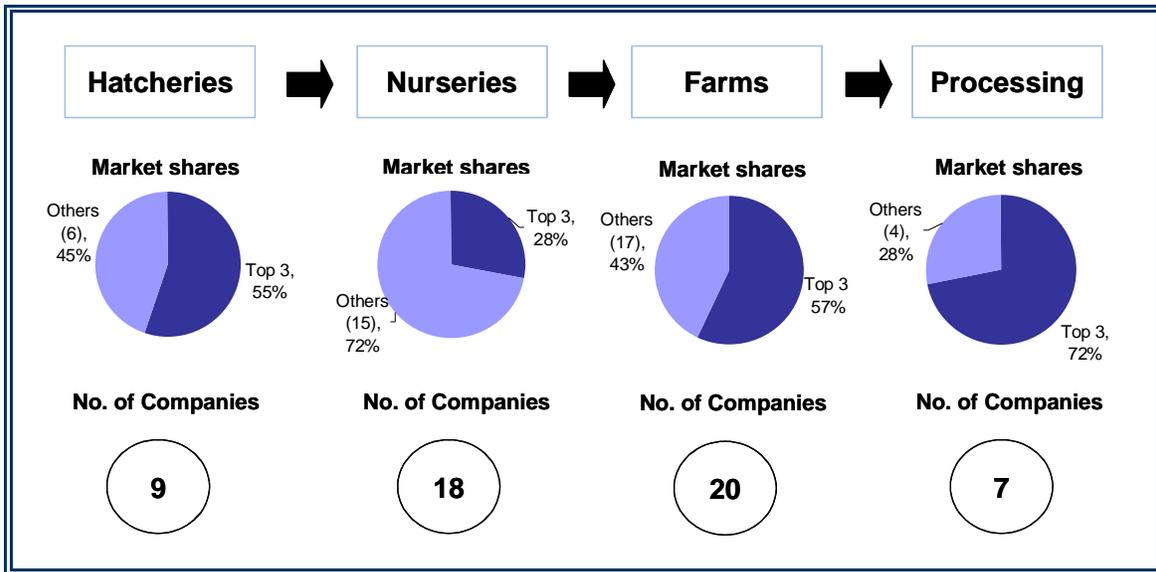
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<sup>40</sup> Panorama Acuicola (2008). [www.panoramaacuicola.com](http://www.panoramaacuicola.com)

<sup>41</sup> Every year there are companies that open and close operations depending on the conditions of the market and, hence, there seems to be volatility in the actual companies that are in activity at any moment, especially at the small farms level, but not necessarily in the overall number of companies per stage in operation.

<sup>42</sup> Used data collected by Gautier (2002). We compared this data with Ceniagua's and government's "Acuerdo Sectorial de Competitividad para la Cadena de Camarón de Cultivo", and found high consistency.

**Figure 9. Market shares in the shrimp industry in Colombia per stage of the supply-chain**



Source: Gautier (2002).

In the second level, the nurseries stage, where a nauplius is nurtured until it becomes postlarvae, the number of competitors is close to 20, with none of the firms controlling more than 10% of the market. Moving along the chain to the farms that produce the shrimp, again there seems to be a relatively disperse group of firms with a number of small players, concentrated particularly in the Atlantic coast, and with the main producer, *CI Océanos*, controlling between 25 and 30% of the farm capacity of the country. On the other hand, in the final stage of the core chain, the processing stage, where post-production and distribution (fresh and frozen shrimp) takes place, the number of companies is relatively low, and the market seems to be concentrated on the larger firms.

From this analysis, there is an indication that the shrimp production market is relatively fragmented in Colombia, suggesting positive competition dynamics within stages.

Another element that is worth exploring to understand the degree of local competition is the extent to which the core value chain is vertically integrated. Examining the activities of each company, we can conclude that there are some companies that are vertically integrated across the chain, from the hatcheries stage until the processing one, including major players such as CI

*Océanos* and *Cartagenera Acuicultura*. This might be an indication of concentration of market power in a few companies, which could be interpreted as negative for the competitiveness of the industry. A different and plausible reading, however, is based on the fact that these companies compete on the international markets, much more than just at the local level. Therefore, to become internationally competitive, they need to integrate operations across the chain. These main firms with integrated hatcheries, nurseries, farms and processing platforms look to set the trends of the industry in the country and obtain optimal efficiency levels across the supply-chain that allow them to compete with operations in China, Thailand, or Vietnam. In addition, a sign of potential competition is that there are a noteworthy number of farms that are currently not in operation, but that could easily resume their activities when the conditions become more appealing. This is an indication that to some degree the companies currently operating need to be competitive to avoid more pressure from other firms in the country. Finally, another indication of competitiveness for Colombia is the low levels of corruption in the country when compared with other major shrimp exporters. According to the World Bank's 2006 Kaufmann Index, Colombia's control of corruption is clearly above the one of China, Thailand, Vietnam or Ecuador. There is no specific cross-country data for control of corruption in the shrimp industry, but there is also no clear indication that it would be much different than the general situation.

**Key Challenges:** Small farms are necessary to increase competition and innovation, but they have a hard time competing against integrated competitors; International markets are demanding more stringent sanitary practices, which can act as trade barriers; Global shrimp prices are decreasing, making the industry less attractive.

## **Demand Factors**

The Colombian shrimp cluster has been fortunate to have growth in local shrimp consumption which is eight times that of the world's growth in consumption.<sup>43</sup> It is worth noting that local producers have been able to capture this increase in local demand, as they have been able to displace imports to minimal levels. Despite this increase in local consumption, in 2005 Colombia's per capita shrimp consumption was still only 0.35 pounds, compared to higher levels in more developed markets like the US (4.2 pounds). This difference in per capita consumption indicates that there is potential for continued growth .

More generally, shrimp is also relatively new to the typical Colombian consumer palette. Due to its high price relative to other meats, it is usually consumed by the high and medium income population in the coasts and in large cities, and its demand is fairly seasonal. Increased consumption occurs during lent and the December holiday season. This indicates that shrimp is still a luxury item for Colombians.

In terms of distribution, although the B2B channel (restaurants, hotels, etc.) is important, grocery retailers account for the vast majority of sales. Within retailers, consolidated supermarkets and hypermarkets account for a large and growing share of market. These large-format growing retailers also carry more shrimp than the average retailer.

Given these dynamics, there is potential for growth from increased consumption outside the coasts and the increasing expansion of large retailers into these non-coastal areas.

**Key Challenge:** Local demand is constrained by high price of shrimp relative to other protein sources and by consumer inexperience in uses and preparation methods.

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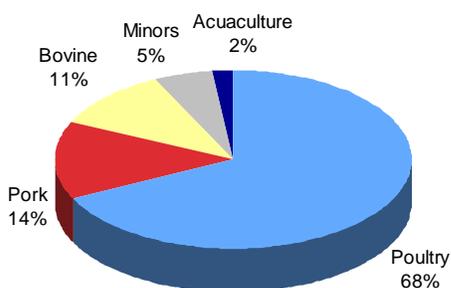
<sup>43</sup> Ministerio de Agricultura y Desarrollo Rural. [www.minagricultura.gov.co](http://www.minagricultura.gov.co).

## **Related and Supporting Industries**

### *Aquaculture Feed Production:*

Some studies have indicated that one of the main hindrances to increasing the cluster's competitiveness is the lack of an aquaculture feed industry.<sup>44</sup> This has led the sector to rely on imports for most of its feed requirement, which has limited Colombia's autonomy and exposed it to exchange rate volatility. Most of these feed imports come from Peru, which has a very competitive aquaculture feed industry. Colombia has a large animal feed industry, but most of it is concentrated in the production of pork and poultry feed and just a small fraction for aquaculture (see figure 10 below).

**Figure 10. Animal Feed Production in Colombia (% Total Tons) – 2003<sup>45</sup>**



Given Peru's competitiveness in this area and Colombia's declining fishing industry, it seems difficult for Colombia to attain a competitive aquaculture feed industry in the short run. However, the country should keep exploring the possibility of promoting a competitive aquaculture feed industry that would support not only the shrimp cluster, but the whole Colombian aquaculture sector.

### *Ports and Logistics Infrastructure:*

As mentioned previously, Colombia has a serious weaknesses in terms of its infrastructure (especially ports and roads), which is a major factor affecting its global

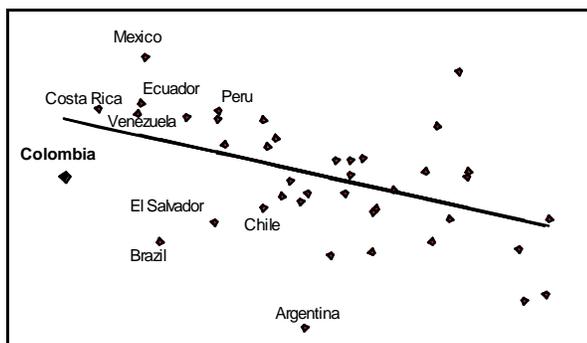
<sup>44</sup> Espinal, C.F., Martínez, H., and González, F. (2006). La Cadena de Camarón de Cultivo en Colombia: Una Mirada Global de su Estructura y Dinámica 1991-2005, Observatorio Agrocaldenas.

<sup>45</sup> Agrocaldenas. La Agroindustria de Alimentos Balanceados en Colombia.

[http://www.agrocaldenas.gov.co/documentos/anuario2005/Capitulo10\\_Balanceados.pdf](http://www.agrocaldenas.gov.co/documentos/anuario2005/Capitulo10_Balanceados.pdf)

competitiveness. In addition to port infrastructure, there is much to be done in terms of port efficiency and logistics. A study undertaken by the Inter-American Development Bank shows that Colombia's performance on this front is far behind some of its Latin-American peers.

**Figure 11. Maritime Transport Costs and Port Efficiency<sup>46</sup>**



Thus, in order to increase the competitiveness of the cultivated shrimp cluster, it is critical for Colombia to enhance not only its port infrastructure, but also to increase the competitiveness of its logistics cluster in general and its cold chain logistics more specifically. This will not only reduce the cost of logistics for the shrimp cluster, but it will also facilitate the cluster's compliance with the most stringent sanitary regulations, both of which should translate into increased competitiveness.

*Financial Sector and Access-to-Capital Government Programs:*

With regards to the provision of capital, it is worth mentioning that Colombia has a relatively well-developed financial sector that can tailor financial options to the shrimp sector. In addition to the ordinary banking system, the agriculture sector counts with an agriculture development bank (*Banco Agrario de Colombia*) through which the government offers special subsidized credit lines. Furthermore, Colombia has an agriculture stock exchange (*Bolsa Nacional Agropecuaria*) that has the capacity to offer equity issuance alternatives for the shrimp cluster, as well as derivatives to support hedging strategies.

<sup>46</sup> Inter-American Development Bank. (2002). [www.iadb.org/res/publications/pubfiles/pubB-2001S\\_1684.pdf](http://www.iadb.org/res/publications/pubfiles/pubB-2001S_1684.pdf)

In addition, the government has put in place several programs that provide financial incentives to support investment in agriculture-related projects, including shrimp aquaculture.<sup>47</sup> These programs include: first, an incentive for technical assistance, through which the government covers up to 80% of technical-assistance-related costs; second, an incentive for rural capital building, through which the government covers up to 40% of capital formation expenditure for agriculture; third, a credit insurance fund, through which the government backs rural credit; and finally, the provision of some venture capital for non-traditional agriculture through the public and private *Corporación Colombia Internacional* (CCI).

Thus, it seems that the shrimp cluster counts both with a suited financial sector and ample government support programs that should provide good access to capital for the sector.

*Pisciculture:*

The pisciculture cluster and the shrimp aquaculture cluster share common structures and inputs. This poses a great potential for sharing best practices, exploring the possibility of sharing assets and capturing synergies, and developing joint hedging strategies. In fact, currently many shrimp growers in Colombia have turned to pisciculture products like tilapia, given the current low prices of shrimp and the relatively more favorable market opportunities of cultivated fish.

**Key Challenges:** Reliance on imports for the supply of aquaculture feed; Low efficiency of port services and need to consolidate a logistics cluster, especially cold chain logistics; Marginal production of shrimp-based preparations that limits possibilities of climbing up the value added ladder and using shrimp byproducts.

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<sup>47</sup> Ministerio de Agricultura y Desarrollo Rural. [www.minagricultura.gov.co](http://www.minagricultura.gov.co)

## **Country Recommendations**

### **Factor Conditions:**

- Work with universities and private sector to increase the number of graduates in technical fields that fit the private sector requirements.
- Facilitate conditions for venture capitalists to operate in Colombia.
- Relax the investing constraints of pension funds such that they can invest in new ventures.
- Coordinate infrastructure improvements with private sector requirements.

### **Demand Conditions:**

- Encourage consumer protection policies and organizations towards increasing the sophistication level of the average Colombian consumer.

### **Firm Strategy and Rivalry:**

- Continue enforcing government policies that have been successful in improving the security conditions of the country.
- Gradually switch focus from securing safety to improving business competitiveness.
- Expand the government policy of insertion into the global markets through signing trade agreements that foment open and free competition.
- Simplify tax policies and procedures.
- Clearly define and enforce property rights.

### **Related and Supporting Industries:**

- Establish an R&D and innovation policy that is coherent with the competitiveness goals of the country and its clusters.
- Develop policies to increase the competitiveness of small and medium enterprises in Colombia.
- Create mechanisms that facilitate the backward linkages between multinationals in Colombia and local suppliers.

## Cluster Recommendations

### Factor Conditions

#### *Government:*

- **Improve infrastructure to decrease distribution costs and reduce local price of shrimp.**  
Today it is less expensive to send shrimp from Cartagena all the way to China than to send it to Bogotá. Thus, it is imperative that the government undertakes the revamping of its ports and roads infrastructure. Fortunately, the domestic agenda that was launched after the negotiation of the Free Trade Agreement with the US includes elements on this regard.
- **Review land property rights in flat coastal areas that are suitable for shrimp farming.**  
The lack of defined property rights of suitable land that is now in the hands of the indigenous population hinders cluster expansion. It is important that the government define these rights, in order to foster new acquisitions of land for shrimp aquaculture.

#### *Private Sector:*

- **Increase Ceniagua's R&D investment in order to improve labor productivity and, thus, compensate for relatively high wages.** Increases in productivity will critically hinge upon R&D achievements. Ceniagua has been responsible for great part of the productivity increases in this sector and it should continue its strong contributions.
- **Increase collaboration efforts between universities, firms, and Ceniagua.** There is ample room for collaboration between Ceniagua, firms, and university programs, in order to enhance innovation. To this date there has been some isolation in what these actors have been doing.

### Demand Conditions

#### *Private Sector:*

- **Initiate public education campaign through Acuanal to increase consumption, familiarity with shrimp preparation methods and nutritional benefits.** Given the low level of per-capita consumption, there is room to increase consumption. Producers should launch a campaign towards increasing awareness of shrimp consumption in the country. This campaign

should be targeted to teaching people about different ways of preparing shrimp and its nutritional benefits.

- **Consider using shrimp byproduct to expand local demand.** Given the high price of shrimp relative to other protein sources, one way to increase local consumption could be through the use of lower-priced shrimp byproduct for the domestic market. Namely, one could channel through the domestic market broken shrimp or shrimp that don't fully meet international standards (ie. size). In this sense, one could think of coordinating with the restaurant cluster to consider opening restaurants exclusively dedicated to the preparation of shrimp-based dishes, using this byproduct.

### **Firm Strategy and Rivalry**

#### *Government:*

- **Improve enforcement of current environmental, sanitary and food safety laws encouraging producers to meet rigorous world class standards.** Sanitary, food safety, and environmental standards are increasingly becoming one of the most important barriers to trade. There is a great opportunity of increasing the sector's competitiveness by being on the standard-setting frontier. The more stringent the sanitary, food safety, and environmental standards are, the greater the incentives for innovation.
- **Elevate ease of doing business efficiency of coastal areas to country average.** A great portion of the shrimp cluster is located near cities that have some of the worst conditions in Colombia for doing business. This is particularly critical in the case of Cartagena, near where much of the shrimp aquaculture is located and through which much of the shrimp production is exported. Cartagena is ranked last in the Subnational Doing Business Report that was issued recently. Thus, the government should work jointly with the private sector towards enhancing the business conditions in cities around the shrimp cluster.

*Private Sector:*

- **Focus on higher value shrimp products (whole shrimp, organic, origin denominated, etc.).** Given the decreasing trend in shrimp prices and the increasing “commoditization” of shrimp, Colombia should jump into the production of higher value exports. One option could be concentrating its production on whole shrimp, for which a premium is paid in the European markets. Another alternative could be developing an organic shrimp line, availing of the increasing demand for environmentally friendly products. A third option could be attempting to attain an origin denomination denoting the Colombian shrimp (see below).
- **Replicate brand strategy of ‘Colombian Coffee’ to develop a high-value image and ultimately claim a price premium.** Consistent with the idea of attaining a quality recognition for the Colombian shrimp, one could think on replicating the Juan Valdez strategy used by the Colombian coffee but for shrimp. The goal would be to encourage the recognition from consumers around the globe of the Colombian shrimp as high quality.
- **Increase collaboration among small players to improve efficiencies from economies of scale.** As was mentioned, many of the big shrimp producers have integrated vertically, which has allowed them to attain scale economies. However, there are a good number of small players that haven’t had the chance to do so and, thus, find themselves in a disadvantaged position. In order to increase competition in the cluster, there should be a greater coordination amongst small players in order profit from economies of scale.

**Related and Supporting Industries**

*Government:*

- **Promote linkages between shrimp and tourism clusters to boost consumption.** One way in which the country could start raising the international awareness for the quality of Colombian shrimp could be by promoting its consumption among the tourists that are increasingly coming to visit this country. Given the nature of the task, the Government should act as a facilitator for this coordination between clusters to occur.

- **Support the development of a shrimp preparations industry.** Colombia's shrimp cluster would enhance its competitive position if it had a competitive shrimp-based preparations industry. Some alternatives could be: cooked, skewered, sauced, e-z peel, shrimp rings, butterfly tail-on, combinations with rice bowls, etc. Currently, this production is rather marginal. Given the numerous distortions associated with the starting of an industry, one could envision the government providing support to lay the foundations for this industry.

*Private Sector:*

- **Enhance port efficiency and logistics.** Beyond infrastructure, having a competitive port services cluster is critical. Port efficiency indexes show Colombia in a not very good position relative to its peers and, thus, there is work to be done in this area. Additionally, the country is in urgent need for a competitive logistics cluster. In particular, there is a need to enhance the competitiveness of cold chain logistics which is fundamental not only to increase the competitiveness of the shrimp cluster but also that of many other agribusiness clusters in Colombia.
- **Explore expansion of local feed industry and its competitiveness vis-à-vis importing.** In order to limit the current dependency on imported aquaculture feed, the cluster should explore establishing joint ventures with the small aquaculture feed industry in order to expand the local production of feed.
- **Collaborate with other industries to explore economies of scale in processing and to increase value-added products.** In particular, given the similarities with the pisciculture cluster, the shrimp cluster should build synergies with other clusters in order to profit from scale economies and increase competitiveness. These similarities would also allow for product diversification strategies.

## References

- Agrocadenas. La Agroindustria de Alimentos Balanceados en Colombia. [http://www.agrocadenas.gov.co/documentos/anuario2005/Capitulo10\\_Balanceados.pdf](http://www.agrocadenas.gov.co/documentos/anuario2005/Capitulo10_Balanceados.pdf)
- Aguilera, Maria Modesta. (1998). “Los cultivos de camarones en la Costa Caribe colombiana.” Centro de Investigaciones economicas del Caribe Colombiano.
- Balcázar, A., Orozco, M., and Samacá, H. (2003) Fuentes y fundamentos de la competitividad agrorural en Colombia. DANE.
- Banco de la República. [www.banrep.gov.co](http://www.banrep.gov.co)
- DANE. [www.dane.gov.co](http://www.dane.gov.co)
- Economic Commission for Latin America and the Caribbean. CEPAL statistics. <http://websie.eclac.cl/sisgen/ConsultaIntegrada.asp>
- CIA World Factbook. <https://www.cia.gov/library/publications/the-world-factbook/geos/co.html>
- Economist Intelligence Unit (2008). “Business Environment Ranking: At a glance”.
- Espinal, Carlos, Hector Martinez and Fredy Gonzales (2006). “La cadena del camaron de cultivo en Colombia: Una mirada global de su estructura y dinamica 1991-2005”. Ministerio de Agricultura y Desarrollo Rural.
- FAO (2007). “Food Outlook”. <http://www.fao.org/docrep/010/ah876e/ah876e10.htm>
- FAO (2008). “Fishery and Aquaculture Country Profile: Colombia”. [www.fao.org/fishery/countrysector/FI-CP\\_CO](http://www.fao.org/fishery/countrysector/FI-CP_CO)
- FAO (2008). “Fisheries and Aquaculture Department Statistics”. <http://www.fao.org/fishery/statistics>
- Flegel, T.W. (1998). “Shrimp Health Management and the Environment. In Aquaculture Sustainability and the Environment: Report on a regional study and workshop.” ADB/NACA.
- Food Market Exchange (2008). <http://www.foodmarketexchange.com/>
- Gautier, Dominique (2002). “The adoption of good management practices by the shrimp industry on the Caribbean coast of Colombia”. World Bank, NACA, WWF, FAO.
- INCODER (2006). “Pesca y Acuicultura Colombia”. Corporación Colombia Internacional.
- Inter-American Development Bank. (2002). [www.iadb.org/res/publications/pubfiles/pubB-2001S\\_1684.pdf](http://www.iadb.org/res/publications/pubfiles/pubB-2001S_1684.pdf)
- Josupeit, H. (2006). “Regulations in Shrimp Trade”. <http://www.globefish.org/index.php?id=3222>
- Ministerio de Agricultura y Desarrollo Rural. [www.minagricultura.gov.co](http://www.minagricultura.gov.co)
- Ministerio de Agricultura y Desarrollo Rural & Ceniagua (2002). “Acuerdo Sectorial de Competitividad para la Cadena de Camarón de Cultivo”.

Panorama Acuicola (2008). [www.panoramaacuicola.com](http://www.panoramaacuicola.com)

Porter, M. (1998). On Competition. Boston: Harvard Business School Press.

Porter, M. (2007). Colombian Competitiveness: Moving to the Next Level. Harvard Business School.

Shrimp News International (2008). <http://www.shrimpnews.com/Prices.html>

UN Data (2008). “A world of information”. <http://data.un.org>

USDA Foreign Agricultural Service (2008). <http://www.fas.usda.gov>

Wikipedia (2008). “Shrimp Marketing”. [http://en.wikipedia.org/wiki/Shrimp\\_marketing](http://en.wikipedia.org/wiki/Shrimp_marketing)

Wikipedia (2008). “Taura Syndrome”. [http://en.wikipedia.org/wiki/Taura\\_syndrome](http://en.wikipedia.org/wiki/Taura_syndrome)

Wikipedia (2008). “White Spot Syndrome”. [http://en.wikipedia.org/wiki/White\\_spot\\_syndrome](http://en.wikipedia.org/wiki/White_spot_syndrome)

World Bank (2008). “Doing Business Report Colombia”.

World Bank (2007). “Doing Business Report”.

World Bank (2006). “Enterprise Surveys: Colombia”.

World Bank, Worldwide Governance Indicators, 1996-2006.  
<http://info.worldbank.org/governance/wgi2007/>

World Economic Forum (2007). “Business Competitiveness Index 2007-2008”.

Yo creo en Colombia (2008). [www.yocreoencolombia.com](http://www.yocreoencolombia.com)

### **Expert Interview.**

Mogollón, Vicente. (March 2008). Former Director of PROEXPORT Colombia and producer of shrimp in Cartagena.