

SOCIO-ECONOMIC IMPACT OF A DISTRIBUTION LOGISTICS CENTER  
OF LIVE TILAPIA IN VERACRUZ, VER.

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**ABSTRAC.**

The overall aim of this research project is to determine the socioeconomic impact of a live tilapia gathering and distribution centre on rural and peri-urban fish farmers. The study area is established in the fringes between urban and rural areas of Veracruz City, in Mexico. Previously, both the national and regional initiatives called Tilapia System Product and Tilapia Veracruz System Product detected the need of strengthening the commercial link in the tilapia productive chain by the creation of a live tilapia collect and distribution centre. Hypothetically, establishing live product among the consumers' preferences will not only increase their protein intake, but will improve also small-scale tilapia farmers' economy. The methodological approach will include marketing studies, a business plan, a financial analysis and pilot tests. Potentially, the main benefit of this research will be the social welfare that tilapia farmers of Veracruz will gain by determining a marketing system, specifically designed to meet their needs, while ensuring the efficiency of the commercial link within the tilapia productive chain. Furthermore, expected findings might help the industry by encouraging ethical consumerism of farm-raised tilapia while promoting local production.

**INTRODUCTION.**

Aquaculture in Mexico has a strong stagnation due to various factors, but the primary is the lack of an efficient marketing system; studies show an option to activate this link in the supply chain: is to establish collection centers and distribution systems that get closer the population to the production of farms; the design of these centers should be done through the analysis of the real needs of the people involved in the sector. These actions will allow people engaged in aquaculture activity to achieve their potential in all areas of human development.

## **BACKGROUND.**

### **HISTORY OF AQUACULTURE IN MEXICO.**

In Mexico aquaculture is emerging in relation to agriculture, however, has gained importance in the last 30 years as it is a generating source of social and economic benefits in populations where practice; contributing to food security, employment and self-employment. <sup>(1)</sup>

Aquaculture in Mexico is not new, as there is evidence that speak of the presence of cultivation fish, algae, aquatic birds, eels and aquatic insects in the Lakes of the Valley of Mexico during the pre-Hispanic era. This aquaculture tradition was lost during the conquest and was until 1883 when he became the first attempt to establish aquaculture as a primary importance when the State by means of the Building Secretary, establishing the Piscicultura. <sup>(2)</sup>

Modern aquaculture in our country was established during the 60's to build the first station aquaculture, originally called Tropical Piscicultura Station in 1964 by mediation of the Papaloapan Committee in Temascal Oax. Between 1965 and 1971 planted 1'000, 000 lavas of african and asian tilapia from the station in the glass of President Miguel Alemán .This action was a social origin, went to reach 20,000 people, mostly mazatecas indigenous peoples who had been displaced from their place of origin; helping to meet their food needs and later, as a means of additional income to the capture of tilapia at the dam for commercial purposes.<sup>(3)</sup> <sup>(4)</sup> Thus initiating aquaculture business, although his main beneficiary remains the social sector. <sup>(5)</sup>

### **SITUATION OF AQUACULTURE IN MEXICO**

Mexico freshwater fish farming can be classified into two categories: open waters such as lakes, reservoirs and dams storage and commercial planting in ponds or other confinement. <sup>(6)</sup> Following three-pronged, aquaculture of development, fisheries in reservoirs and controlled for the purpose of marketing with large investments. <sup>(7)</sup> There are aquaculture activities in La Paz, B.C. Sur, Yavaros, Son., Sinaloa Centro, Norte y Sur, Nayarit, Col., Oaxaca, Chiapas, Veracruz Centro, Tabasco y Campeche.<sup>(8)</sup> The development of the sector has been slow, resulting from the following factors: poorly focused sectoral development policies, successive changes in governmental institutions, inappropriate use of basic scientific and technological knowledge and availability of resources for the development of an appropriate legal framework to ensure the legal tenure information gaps by facilitating the provision of services and care financial institutions <sup>(9)</sup> as well as a long chain of marketing.

The tilapia are the group most cultured fish, represent more than 60% of the crop in workplaces aquaculture and producers in the sector. <sup>(10)</sup> Since 1990, is a major producer and consumer of tilapia, ranks third in importance for production (by weight) and the fourth in value after tuna, shrimp, Octopus. <sup>(11)</sup> Represents more than 12% of total fish production. <sup>(12)</sup> In 2003, a considerable increase in the production of tilapia is expected in the coming years <sup>(13)</sup> since has presented more than 10% in recent years sustained growth. <sup>(14)</sup> Tilapia industry has a high potential for success, since its growing demand in the domestic and international markets place it as a latent source of jobs and currency. <sup>(15)</sup>

## **PUBLIC POLICIES.**

Aquaculture is an option to complement agro ecosystems which generally are based on farming or if replace it, however, the operationalisation of the aquaculture systems production to do without minimum skills for handling causes short-term failures in them; <sup>(16)</sup> marketing production is one of the most sensitive parts of this bug.

Commercial production of tilapia obtained by aquaculture is to end the sale of the product and under the approach of the Sustainable Rural Development Act is seen as an agricultural product and aquaculture as an economic activity that promotes the sustainable development of rural communities. <sup>(17)</sup>

The Mexican Government through the SAGARPA, promoted the Organization of the national productive sector of tilapia aquaculture chain on the creation of the National Tilapia Product System and in the State of Veracruz, the Veracruz Tilapia Product System <sup>(18)</sup> and by their masters programs, found the urgent need to strengthen the link marketing to consolidate the sector; presented the strategy of establishing tilapia distribution centers in the towns, as a measure to ensure the direct production of farms displacement aquaculture to final consumers, the feedback information market and consumption; preferences as well as the opportunity to establish value chains of production of the tilapia. <sup>(19)(20)</sup>

## **VERACRUZ AND AQUACULTURE.**

The State of Veracruz had a 14, 349 tons of tilapia *spp* in 2008, with 189 aquaculture tilapia farms and is the main producer and consumer nationally <sup>(21)</sup> and has

thus remained at over two decades. <sup>(22)</sup> The center of the State of Veracruz is the place where converge more tilapia aquaculture production units; <sup>(23)</sup> be located more than 1500 units of production throughout the State. <sup>(24)</sup>

Veracruz City has a population of 512,310 inhabitants <sup>(25)</sup> with a tradition of stable mojarra along the length of the year; consumption has multipoint distribution of fish and seafood established primarily in municipal markets. This demand is being covered mostly by fresh tilapia or imported, since much of the production of farm stays in the villages that surround or is marketed by agents to other States. <sup>(26)</sup>

## **TILAPIA ALIVE.**

The presentation of the "living" fish represents a significant business opportunity <sup>(27)</sup> that serves the need to create a product that could be competitive in the local market, dominated by the tilapia of fishing with low price but with seasonal offer and the asian tilapia frozen, also low price but doubtful quality. <sup>(28)</sup> The alive tilapia has features that are difficult to match its competitors: freshness and taste, and the innocuity for controlled production processes. <sup>(29)</sup>

Live product sale is the best choice for a product with added value with high source of protein whose cost of production is the lowest and represents a real choice of business for the producers (lack of supply in the population of the region that lacks direct marketing points of farms, suggest us the establishment of a logistics centre; to cover the supply demand at any time of year and identify the socio-economic interrelationships to be generated on your operation centers and live product demand growth. <sup>(30)</sup>

A logistics centre of distribution of living tilapia is a tool that could take several models of operation according to the needs of each area, but the concept focuses on product availability and where it is necessary to meet the demand, through the coordination of the workflows and information points of sale of tilapia. <sup>(31)</sup> The concept of collection center as a logistics centre of distribution is a possible option for improvement to strengthen the tilapia in the city of Veracruz and the surrounding market.

## **PROBLEMATIC SITUATION.**

Lack of efficient systems marketing, information and technology within the link in the production chain of Veracruz tilapia industry has a direct impact in the production of farm aquaculture, causing economic stagnation that while there is a strong internal market of tilapia, the only successful marketing means is the sale of the living organism at foot of pond by the same farms, since the rest of the production is destined for the subsistence and fresh in local markets. <sup>(32)(33)</sup> This way to market their product can affect future if it is not

timely harvested production; to stay longer than planned that the investment does not return, directly affecting the economy of the producers.<sup>(34)</sup> What encourages technological levels is minimal by lack of resources for investment and production in the subsistence level for its participants.

The lack of training and professionalization of aquaculture systems development models is a reflection of the little acuacultural tradition that the population has, which in turn generates low rates in its human development in relation to other productive sectors, to not achieve sufficient income to enable them to access mechanisms responsible for the welfare of the population. Another serious problem of the marketing of tilapia are the intermediaries, who obtained the greatest margin utility to fix prices to producers.<sup>(35)</sup>

## **JUSTIFICATION.**

The main contribution of this project is the socio-economic benefit producers tilapia aquaculture will get to design a system of marketing according to their type and needs to be implemented to ensure efficiency in the commercial link in the production chain for the cultivation of tilapia, allowing increase agro ecosystems aquaculture stakeholders integral human development.

## **METHODOLOGICAL FRAMEWORK.**

Research design in two stages, the sequence of construction and operationalisation, first we cover design collection center, market research, financial projections, management plans and operational design. The second script includes analysis of the economic and social impact that the sale of living tilapia can have on people this pilot test.

## **METHODOLOGICAL ELEMENTS OF THE SEQUENCE OF CONSTRUCTION.**

To achieve logistical alive tilapia distribution center design followed four phases and by a multidisciplinary team developed the design, operation, and the same financial proposal; aimed to meet the requirements expressed by the members of the Veracruz Tilapia Product System Committee.

1. Awareness and planning phase. Three possible strategic lines of development of the centre according to the needs expressed by each of the participating sectors were established through socialization with those concerned in the production chain of tilapia.
2. Options analysis phase. For each of the lines of the Center, whereas the preliminary design, production, costs and economic analysis function feasibility studies development. Developed matrices of advantages and disadvantages for each scenario.
3. Approach phase. Submitted proposals to stakeholders, opting for the design that includes the area of reception and marketing of the product, Office of operations and business center, process area for consideration; this option considered the modality for point of sale products frozen in chains of supermarkets or convenience stores, small freezer and living tilapia exhibitors. Also envisages the possibility of installing live tilapia smaller retail outlets in areas where the scope of the centre is lost, but it is the provider of such as an option to extend its area of influence.
4. 4. Structuring phase. The distribution center was covered in three volumes, the first being the administrative and commercial area on two floors, the second comprising the life-support area and the third process and service areas.

## **MARKET STUDY.**

The Veracruz Tilapia Master Program reports the following marketing data: in Veracruz we can find cultivated tilapia market in two ways, foot pond and fresh local fish alive although their participation in these is minimal, being the Tilapia capture, import and other States from which are sold.

Presentation of tilapia cultivated with greater importance is alive at foot of pond and its marketing is based on supply and demand; represents the best producer sales opportunity to price. This option this out of the reach of the city due to the location of the farms now intermediaries are those already carried out in a formal manner. There are brief attempts to direct sales to the consumer within the urban area, but even his influence on the market is unknown.

Tilapia in its presentation as product live is greater acceptance in the market by the security to consume a product fresh from consumers, saving considers the producer not to handling post-harvest and the added value that the producer considers selling live leads: freshness and taste, smell, color and texture quality. The lack of technology and information from producers to give value added by the transformation can also be the cause of the sale live pond walk is the largest marketing medium.

There are five types of marketers of tilapia according to the quantities sold and their level of sophistication: low, medium low, medium, high, medium high. Low level is not technical and uses only ice as a form of conservation, the medium under account with more technology uses frapé ice, containers and refrigerators; the next level using electrical energy for cooling and ice to present the product and keep it, just in the last two electrical energy is used to preserve in freezing and cooling, products exhibition becomes ice and refrigerators. As more tecnify is the least important trader company is the proportional amount of tilapia. There are some marketers street tecnify and shops with tilapia alive as a product.

We can speak of an increase in demand of tilapia in general and so far it is dissatisfied from producers and marketers premises. The evolution of consumer leads to consider three fully identified segments:

- Tilapia whole fresh, the traditional form of consumption. It is marketed in \$ 60.00 per kilo.
- Fresh tilapia in steak. It is marketed in \$ 90.00 per kilo.
- Frozen tilapia fillets, and whole (import). Sold on average at \$ 43.00 per kilo.

Potential segments are:

- Transform tilapia. In bars, nuggets and fillets.
- Viva tilapia retail. Sold in \$ 50.00 to consumers.

## **MACROLOCALIZATION.**

Considerations to be taken into account the centre achieve success in their operations is the choice of a place to submit an access to markets, sufficient demand and consumer buying capacity; offer constant farms and public services to the normal operation of the Centre. <sup>(36)</sup>

Considering the criteria above and based on studies carried out previously, the area between the municipalities of Tlalixcoyan, Medellin de Bravo, La Antigua, Veracruz, and Boca del Río, located within the State of Veracruz, central has a high potential to develop a logistics with the characteristics of social impact, distribution center economic and environmental to ensure their stay. <sup>(37)</sup>

The State of Veracruz is located on a coastal strip of 745 km. long located on the coast of the Gulf State of Mexico. Due to its conformation and resources the State has a high incident development potential in the national economy.

## **MICROLOCALIZATION.**

The municipality of Veracruz is located in the central coast of the State of Veracruz, surrounded by the municipalities of La Antigua, sheep pass, Manlio Fabio, Medellin and Boca del Río. He develops a wide range of economic activities, making it one of the municipalities with greater influence on the economic development of the State: agriculture, livestock, fisheries, industrial, commercial and tourist activity.

## **CORPORATIVE IMAGE.**

The logistic distribution center shall have the mission and the target goal needs sustained consumer and tilapia aquaculture producers sale offering a product that meets the quality standards required by the market in times that are required.

## **LEGAL FIGURE.**

Legal figure suggested conforming to those interested in establishing and operating the living tilapia collection center is the limited company pursued non-profit to market the tilapia and profit from the activity. A limited is a company commercial, independent in its legal personality to partners that are limited to the payment of their actions and form under a name; that will be different to any other company and will be followed by the words "Limited company" or the initials "Inc." <sup>(38)</sup>

## **LABOUR REQUIREMENTS.**

In order to meet demand for operations center requires, foresees the recruitment of 12 people, divided into three operational departments: Administration and public; maintenance and processing; and those intended for the General Services area.

## **PROGRAM AND INVESTMENT STRUCTURE.**

The total cost including infrastructure and equipment of the investment is \$ 5'473, 557.00; deferred investment comprising corporate image and licensing considerations is \$ 168,000.00, and the cost annual operating is \$ 121,000.00. Being investment total initial \$ 5'763, 420.00.

According to the financial projection on a horizon of 5 years <sup>(39)</sup> provides a steady increase in the flow of cash from the second year of operation, of 49% average annual in relation to the first year; not whereas payment of capital or financial cost for not being financed investment, performing with own resources; investment cash flow is considered the usefulness of the project, growing it over the years by the consolidation of the production cycle.

The second year of operation is considered as the year stabilization as it leaves fixed investment is projected collect and sells 32.4 tons of live tilapia, 7.2. Ton. Frozen tilapia, 21.6 ton. Steak and 10.8 tons. Of minilla, bringing revenue by \$ 6'858, 000.00. The total annual operating costs are absorbed by the raw materials and labor mainly being a total of \$ 4'887 632.00. Here requires members to make an investment of capital to cover the costs of operation \$121,863.00, while the centre able to economically self-sufficient.

The level of sales of the two year to achieve balance shall be \$ 2'894 396.00 (49 % of scheduled income), this balance is really low compared with the total projected income, which tells us the convenience of investment since it covers all fixed costs starting second year are calculated at \$ 1'518, 059.25. The relationship cost benefit is 1.41 (R C/B >1. 0), obtaining a 40% of utility on each invested peso.

The rate of financial profitability is 19.9% to 3% surcharge considered acceptable 16%. (TREMA). The net present value (NPV = 0) is estimated at \$ 497,000.00 which shows the convenience of investments be economically profitable.

To perform a analysis of sensitivity to various scenarios, the project supports an increase in the costs of raw materials up to 32% and a decrease in income of up to 26% the relationship cost benefit of above the 1.04 and on the most critical stage with the conjunction of all negative as low production and price of sales; and an increase in the costs of up to 14% presents a relationship cost-benefit 1.06. As a result to the financial above described the project it provides economically, financially cost-effective and technically viable

## **END CONSIDERATIONS.**

The project shows that the operation of the centre can be successful, but still have no scientific evidence to support this assertion; the results obtained through empirical analysis allow us to set the above. <sup>(40)</sup>

Previously established on the program master tilapia Veracruz, which States that the operation of a living tilapia collection Center and major strategies of distribution, could be the solution to the problem of the link in marketing within the chain of production; and the realization of the design of this system depending on the needs of producers of tilapia grouped into CSPTV, the establishment of the centre is a real option to get the demand and supply of tilapia in Veracruz. This design is replicable across the State, bringing the same benefits elsewhere in development.

The design was development following the good management practices in the production and marketing, in accord with requirements of health and safety established by FAO, and it seeks to accreditation by the HACCP (Hazard Analysis and Critical Control Point); all this in order to drive towards more sustainable, through a system of efficient marketing and scenarios tilapia aquaculture development.

The social and economic impact most important that we can provide, is the approach of high quality aquaculture products to consumers, we have to consider the sources of direct employment will be developed and indirectly in the farms when raise staff by production; increased requirements is also expected an increase in the number of production to be considered as profitable to having a stable of year-round market and direct producers income increased activity units. This increase will enable their quality of life to grow, as it will be able to invest in areas of health, education and economic to improve conditions of life currently have.

These considerations still we cannot confirm through operational analysis since the second phase of the study is not still takes place; but we believe to be in a position to do so at the end of a year, in that testing pilot alive tilapia sales report their operating results.

The risks may occur and prevent or decrease results positive operation and socio-economic impact are: lack of supply of raw materials by decline in production due to natural phenomena or low and financial crisis in sales because of increased costs of the products to global economic crisis situations or increase in inflation points

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