



# Territorial Intelligence in the Impulse of Economic Development Initiatives for Artisanal Fishing Cooperatives

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**Abstract.** Sustained globalization by digital technologies has dramatically increased the capacity of the capitalist environment, putting at risk the preservation of cultural and community identities, interfering with their ability to act and adapt in a sustainable way to their environments. This paper presents a sustainable management strategy for the promotion of territorial economic development initiatives for artisanal fishing cooperatives of the province of Santa Elena, so that it can be effectively constituted as a political strategy for the country's development, seeking not only macroeconomic goals for stability and productivity excellence, but also socio-economic goals aimed at preserving natural resources, the redistribution of social wealth and the reduction of social inequalities.

**Keywords:** Territorial intelligence · Viable System Model · Artisanal fishing Cooperatives

## 1 Introduction

Intelligent territory is formed through learning environments, which function as collectors and repositories of knowledge and ideas, which are responsible for innovation and its diffusion in the conduct of the regional development process.

In the context of the solidarity economy, the construction of new labor relations through the processes of productive restructuring, highlighting the sustainability of development projects that are not always supported by the necessary mechanisms and instruments, both at the level of technologies and at the level of their articulation with macroeconomic planning and thus are verified in a set of fragmented policies.

Contradictorily, the possibilities of solution exist through the challenges and appear at the local level, where alternative, associative and cooperative forms are built for the confrontation of the problems, starting in the initiative of the working classes. It shows the possibilities and challenges of sustainable development and solidarity economy as instruments of democratic and participatory management of workers who build networks of solidarity through new forms of organization, where social and collective interests are respected.

The aim of this project is to achieve a coordinated, decentralized, democratic, adaptive, sustainable and efficient management of cooperatives in the province of Santa Elena, integrating artisanal fishing activities and possibly other sectors of production and services, as a means of articulating solidarity activities in the province of Santa Elena. The objective includes the coordinated management of existing cooperatives as well as the cooperative formation of economic associations within the integrated sectors and the resulting grouping in a cooperative way. For the integration of the artisanal fishing activity, the creation of a Fisheries Development Unit is sought.

## 2 Territorial Intelligence

Territory can create an environment conducive to innovation, sustained by technology and technological innovation. Within this context, the concept of intelligent region appears as an alternative to assist the territorial organization of space, in order to generate an innovative environment capable of triggering a process of sustainable development in the precursor sites.

The discussion about technological innovation and its role in the promotion of economic development appears in the literature from the classical economists. Two types of innovation are presented: radical innovation and incremental innovation. Radical innovation is associated with the paradigm shift and brings something totally new, in incremental innovation, technique or equipment are maintained with their essential characteristics, it is an improvement of something existing. Regardless of the type of innovation, when this occurs, it brings a perspective of greater return on the volume of investments and higher rate of profit and virtuous circle of growth of the level of employment and income in the territory [1]. Support for territorial growth can only be achieved through investments in research and technical training, thus stimulating innovation and diffusion of technologies for the entire regional system.

This institutional environment, which stimulates innovation, is conceptualized as a regional innovation system, stimulating the interaction of basic research and applied research, researchers and entrepreneurs, innovation, diffusion and incorporation of new technologies, as well as increasing qualification of the workforce. In the environment, organizational and institutional structures that enable cooperation should be predominant, as well as fostering the efficient use of information flows and the means to create knowledge. It should be remembered that a regional innovation system will only be established if there is interest in organized society and local public power, since the success of this type of growth strategy depends to a large extent on the degree of interaction of local organizations and institutions.

Thus, we can deduce that the intelligent territory are regions that constitute privileged territorial contexts of interaction, learning and innovation that are configured in relational spaces between actors that intersect by cultural and economic affinities. Intelligent regions are true learning environments, whose information and knowledge are easily propagated. These regions function as collectors and repositories of knowledge and ideas, whose infrastructure and institutional environment facilitate the flow of ideas, knowledge and learning [2]. In the intelligent region, the capacity for innovation and assimilation of new techniques, technologies and knowledge is urgent. In this type of region, the institutional base must favor learning and, in turn, the accumulation of knowledge, which are the main vectors of the regional development process.

### 3 Relevance and Potentiality of the Santa Elena Fisheries

Among the private economic activities of the province is the fishery, with its extensive coast being one of the main centers of fishing activity in the country, along with Manabí, Guayas and Galapagos. According to archaeological evidence, fishing activity is recorded even in the early formative period (3,990–2,300 BC), which makes this activity one of the most important cultural heritage of the province and the country. But today, according to information from the Food and Agriculture Organization of the United Nations [3], the province is a privileged place for global fishing activity.

This is shown by the fact that Ecuadorian fishing and aquaculture accounts for about 14% of the country's Gross Value Added and a share of 9.6% in shrimp exports, 1.2% in the rest of the fish, 4.2% in canned fish and 0.3% fish meal. In terms of labor activity, the fisheries sector was, according to FAO estimates, occupying about 85,000 people in 2009 (of which about 6,500 were in the industrial subsector) [3]. For the Ecuadorian artisanal fishing sector, FAO highlights the favorable opportunities it offers to become an “organized, productive, highly competitive, dynamic and integrating sub-sector of social, economic and cultural development, with integrated and sustainable management of fishery resources”.

In order to materialize these opportunities, the same international organization emphasizes the capacities of the cooperative way of organization integrated in Community Fisheries Centers that, in turn, sponsor Fisheries Development Units [4]. However, according to information requested from the Ministry of Agriculture, Livestock, Aquaculture and Fisheries, in relation to the cooperative articulation of the fisheries of Santa Elena, it should be noted that of the 35 fishery groups registered in the province, only 37% are cooperatives.

This outstanding fishing capacity of the region of interest; and of Ecuador as a whole, contrasts with the role of fish consumption in food sovereignty (of which the article 281 of the constitution is a specific object). Ecuadorians devote on average only 1.4% of their current expenditure to fish consumption, compared to 4.7% for meat, 4.5% for bread and cereals, and 3.4% for milk and by-products [5]. This consumption of fish is equivalent to 5.7% of the total used in food, using this source 8.1 kg per

inhabitant per year (a reduction of 55% compared to the consumption estimated for 1980 [3]). In comparison, a country such as Spain (main customer of Ecuadorean fish exports), whose fishing capacity is somewhat higher than Ecuador's (around 50% higher), uses 12% of the total fish consumption in fish consumption (2.1 times more than the Ecuadorian), taking advantage of this source 43 kg per inhabitant per year (5.3 times more than in Ecuador) [3]. Since this is a double population, the balance of production and consumption makes Spain a net importer. However, without the need to reverse the positive economic balance of fishing activity in Ecuador, there is considerable scope for simultaneously favoring food sovereignty and improving health through increased consumption. On the other hand, the vertebration of artisanal fishing activity in Spain in the 20th century shows that improving the living conditions of fishers is compatible with preserving the environment for the benefit of long-term food sovereignty. The creation – before mentioned – of Community Fisheries Centers based on cooperative organization sponsored by Fisheries Development Units is a very appropriate strategy to achieve this purpose [6, 7].

However, according to the National Federation of Fishing Cooperatives of Ecuador, the artisanal fishing sector now has a regulatory framework for the defense of fishermen's rights and environmental protection, while presenting other structural problems related to: rational management of fishery resources; the implementation of sustainable development projects in the sector; the inadequacy of fishing, conservation, processing and distribution infrastructures; low level of training; and the limited applied research capacity in this subsector [8, 9]. An adequate structure of artisanal fisheries, which includes everything from the coordinated and scientific management of resources to distribution and marketing, offers a great potential for the sustainable development of the province in its social and environmental dimensions.

Despite its prominent role both in food sovereignty [10] and in employment or in the preservation of cultural identity, artisanal fishing – as reflected in the study by Benavides, García, Lindao and Carcelén (2014) – “is developed with high levels of inequality, being the most vulnerable, artisanal fisherman who lacks a boat, who is part of a crew and does not handle any other resource than his skill.” [11]. The level of income significantly indicates the level of precariousness of life of artisanal fishers, which means that “in synthetic terms, 6 or 7 out of 10 fishermen live in very poor households benefiting from the Human Development Bonus” (ibid). According to these authors in their study about marketing strategies in this fishing subsector: “precariousness and inequity is explained by the way in which the activity operates. Whether or not the fisherman owns a vessel, the great beneficiary of it is the merchant who, at the beachfront level, buys fishery products, setting the price at his discretion. “These actors are closely linked with who hire the crew for the fishing task, and sometimes it is the same person adopting the figure of shipowner. In this way, “in the fishery the old figure of the” developer “is reedited, a person who by means of continuous loans commits the fisherman”. The authors conclude that a serious intervention proposal in the sector is due to affect the commercialization phase, which, as it is observed, is linked to the development – credit for fishing.

## 4 Sustainable Management Strategy

Cooperative activity, despite its social importance and its potential for meeting the goals set by the Ecuadorian constitution, has limitations in the province of Santa Elena, as in the rest of the country, in terms of its ability to structure socio-economic scale on a scale that requires confrontation with important economic, social and environmental challenges.

In the province of Santa Elena, the artisanal fishing sector now has a normative framework for the defense of fishermen's rights and environmental protection, but at the same time presents relative problems: the rational management of fishery resources; to the implementation of sustainable development projects in the sector; insufficient fishing, conservation, processing and distribution infrastructure; low level of training; and the limited capacity for applied research [8, 9].

However, an adequate and integrated management of fishery resources could make artisanal fisheries an "organized, productive, highly competitive, dynamic and integrating subsector of social, economic and cultural development" [3].

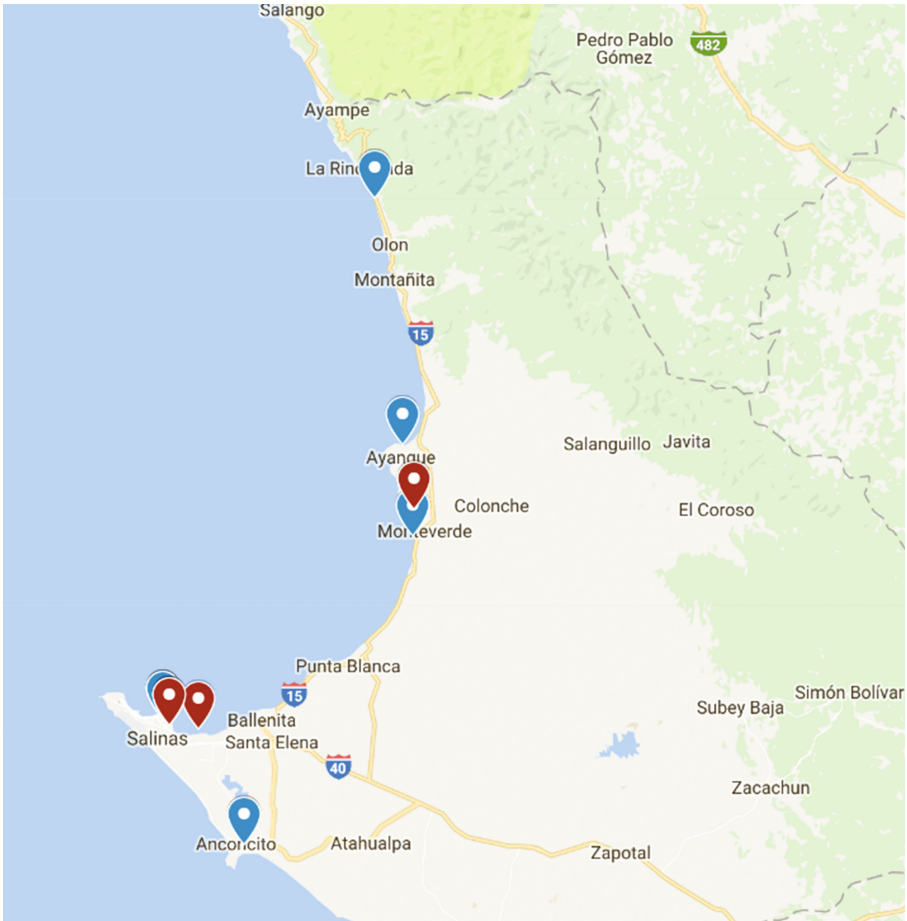
A suitable cooperative structure in a sector of activity of socio-economic and cultural importance such as artisanal fishing could serve as an articulating axis for other socio-economic activities, in particular those that can contribute an additional value to the efficiency of the contemplated activities.

With the objective of presenting a sustainable management strategy for the promotion of territorial economic development initiatives for artisanal fishing cooperatives in the province of Santa Elena, during the year 2015 meetings were held with various fishing groups. The participation of a sufficient number of these allowed establishing the joint objective of articulating a cooperative associative structure that allows an improvement of the capacity of the associates based on a model of sustainable management, without impairing the autonomy of the operative groupings in their context of performance.

### 4.1 Santa Elena Fisheries Organizations

According to the information provided by the Ministry of Agriculture, Livestock, Aquaculture and Fisheries, the number of fishing organizations in the intervention area amounts to 35 (of which 20 are classified as associations, 2 as pre-associations and 13 as cooperatives), so this subgroup accounts for 25% of the total groupings.

It should be noted that among the participating (non-cooperative) associations of fishermen the cooperative way of organizing, according to their representatives' statement, had not been chosen for reasons of administrative complexity and for lacking a clear idea of their organizational peculiarities, obligations and benefits. However, in all cases the interest of developing a cooperative group constitution was manifested. The geographical distribution of these fishing groups, which, as can be appreciated, offers a pillar of provincial articulation around which eventually more clusters could be integrated (see Fig. 1).



**Fig. 1.** Distribution of fishermen's groups. Associations and cooperatives.

The fact that these are artisanal fisheries groups allows to focus the operational management in this type of activity whose socio-economic and cultural impact presents special advantages with respect to other fisheries subsectors with regard to food sovereignty, employment, cultural identity, socio-community structure and sustainable management of resources. The benefit of the integration of research, education and coordinated and sustainable management of resources – according to the analysis of the artisanal fishing organizations themselves and according to the studies and international recommendations mentioned above – strengthens the objective of creating a Development Unit Fisheries with a cooperative base and links to academic institutions [6–8]. On the other hand, this goal is aligned with the Millennium Development Goals, as global fisheries are considered to be a highly effective instrument for their achievement [7].

## 4.2 Conformation of the Fisheries Development Unit

For the articulation of the other components required for the Fisheries Development Unit (FDU), it is considered that the distribution of components considered for this project correspond to the components required for its long-term sustainability, i.e.: (1) socioeconomic observatory to component 100); (2) cooperative integration (dedicated to the extension of the cooperative grouping or the intensification of its level of integration, akin to component 200); (3) development of information systems for the structuring of cooperative activities (related to component 300); (4) Training and research (related to component 400); (6) Adaptive management of FDU (related to component 500). To these components it would be necessary to add, at the operational level, the cooperative activity itself (or integrated sectorial activity). Beyond the horizon of the project, this unit – temporarily operative – could come together with the second component in that this integration activity is something that must be addressed – according to the principles of cooperativism – from the grouping of cooperatives. Likewise, assuming that the grouping transcended the sectorial level, the Fisheries Development Unit would be transformed into a Cooperative Development Unit dedicated to the integral management of capacities and resources with the relevant academic units.

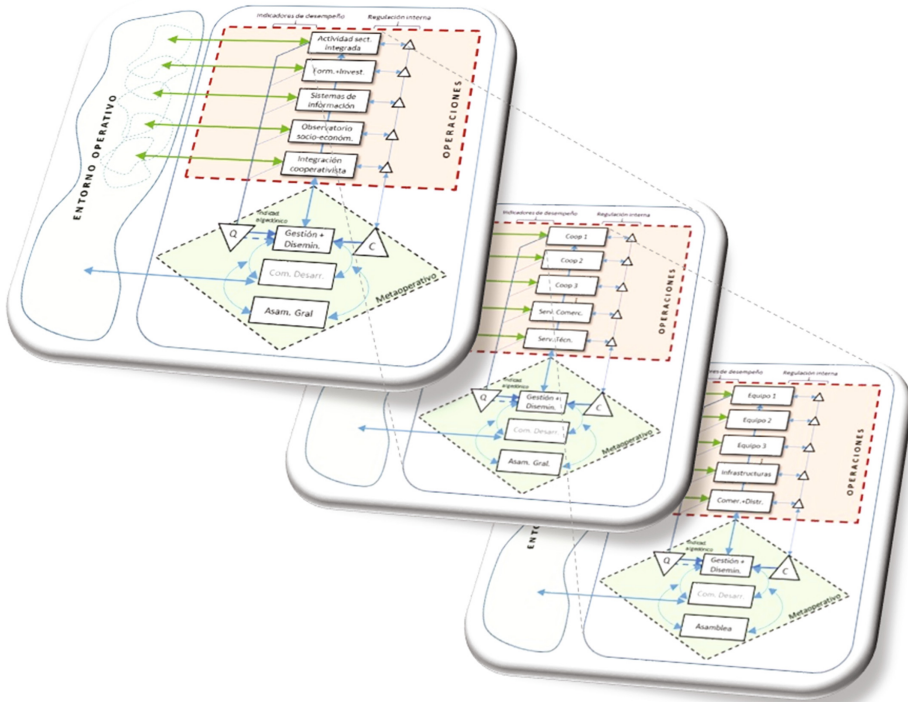
The technical feasibility of the project rests on the use of the Viable System Model (VSM) [12] applied to the coordinated organization of the objective sectorial activity (articulated by cooperatives and local and provincial cooperative groups) of the appropriate information tools that meet the sustainability conditions of the VSM. The same organizational model will be used for the formation of the FDU and for the management of the project itself, so that the structures created for it will be a substrate for the sustainability of the long-term project results.

VSM offers the basic organizational scheme to which all the organizational structures foreseen in the project will be accommodated: management of the activities foreseen in the project; re-organization of fishing cooperatives to improve their operational effectiveness while preserving compliance with their own cooperative principles; the sectorial or inter-sectorial grouping of cooperatives; and the fishery development unit.

Figure 2 illustrates the composition of the FDU in the different levels of organization considering a median size of cooperatives. For larger cooperatives, an additional level of organization would have to be added, so that in total the planned structure includes four levels of organization, which according to the initial forecast would allow efficient and democratic articulation of up to 100 000 people. If this organizational complexity is compared with that of the Mongragón Group, it is observed that they are corresponding and that the second articulates at present, in a very efficient way, the activity of 74 335 people distributed in 261 groups [13].

However, taking into account that the upper level in our case corresponds to the UDP, the equivalent in the case MCC would be that of the cooperative movement of Euskadi, and therefore would be 5 organizational levels. On the other hand in the cooperative integration of the MCC are represented a multiplicity of sectors of activity (financial, productive, distribution, services, knowledge). The MCC's organizational capacity would therefore be of a higher order and could correspond to the case of adding a level for the integrated management of several sectors.





**Fig. 2.** Nesting of organizational structures from FDU to grassroots cooperatives.

Artisanal fishing sector is weakly structured and has deficient infrastructures. According to statistics provided by FAO [3], based in turn on information from the Secretariat for Fisheries Resources (SFR) 2009, artisanal fishing activity in the old province of Guayaquil – which included the present provincial territory of Santa Elena – was distributed in 41 coves where 17 819 fishermen worked, representing around 30% of the national total.

In the Santa Elena region there are 41 coves, 17816 fishermen and a total of 4070 boats. The composition of the artisanal fishing fleet of this region its composed by fiberglass vessels (32.6%) and wooden boats (27%) stand out [3].

In Santa Rosa and Anconcito are located the main fishing ports of the province, Santa Rosa being the main provincial port in volume of catches of artisanal fishing. The two ports are within the scope of intervention of the government project that intends to build – among other basic infrastructures – 27 docks along the entire Ecuadorian coast until the end of 2017 for the modernization and strengthening of this activity.

The new Anconcito port infrastructures undoubtedly represent a major substrate for the improvement of the subsector in the province, which, however, operational level should be complemented by extractive, productive and distributive infrastructures as well as organizational structures.

However, although both ports concentrate the largest artisanal fishing activity in the province, the rest of the 31 coves distributed along the entire coast of Santa Elena have



a significant volume of fishing and occupation, infrastructure and vertebration is even more remarkable [11]. Organizationally, the artisanal fishing activity of the province, as indicated above, is supported by some 7 475 people that are articulated in 35 groups, of which 20 are associations, 2 pre-associations and 13 cooperatives.

As indicated above, the fishing sector, and in particular the artisanal sector, is not very structured, but it has entities that group – generally at national level – the sector with different purposes. In general, it can be said that for any sub-sector, there are no intermediate instances (local and regional) that allow the decentralized management of issues of common interest, while there is a lack of representative national, regional or local bodies that allow comprehensive management of common problems. In the case of fishing cooperatives, this problem is visualized by the existence of a single national representation body, the National Federation of Fishing Cooperatives of Ecuador. For national associations and fishing companies, the National Chamber of Fisheries, the National Chamber of Aquaculture, the Association of Shipowners of Fishing Boats, the Tuna Association of Ecuador and the Association of Exporters of White Fishing.

It is interesting to carry out integration in a sector from which significant wishes and benefits can be obtained in the area described. The fishing activity undoubtedly represents a very appropriate sector for the proposed objectives. On the one hand, there are enough cooperatives and groups of fishermen to tackle the proposed objective, but it is also an economic sector of the highest importance in the area of intervention that is affected by important problems of inequality.

The World Conference on Small Scale Fisheries, “Ensuring Small-scale Fisheries: Responsible Fisheries and Social Development,” convened by the Food and Agriculture Organization of the United Nations (FAO) in Bangkok, noted the need to achieve “A comprehensive and coordinated strategy to ensure and expand the capacity and freedom enjoyed by fishing communities, including civil and political freedom to participate meaningfully in the processes that shape their lives.” In this sense, a general recognition of the mode of cooperative organization in its capacity was pronounced: (1) Increase the stability and responsiveness of fishing communities; (2) To increase the capacity of fishermen to negotiate prices with intermediaries, to help stabilize markets, to improve post-harvest practices and facilities, and to sustain marketing logistics and market information; (3) Encourage higher levels of commercial competition by establishing auctioning systems, contributing to market information and, where appropriate, procuring supplies or investing in common structures such as refrigeration plants and fish processing facilities; (4) Save-by increasing bargaining power-in wholesale purchases of rigs, engines, equipment and fuel, and gain more political influence and bargaining power with the government and (5) Also provide microcredit schemes for fishermen, which would reduce their dependence on intermediaries and give them more flexibility in the choice of buyers, which would favor small-scale fish buyers and sellers.

Taking into account the low penetration of social insurance, it is expected that the population over 65 (5.6%) will present significant cases of vulnerability. In this sense, the cooperative mode of organization is in itself an adequate measure to deal with these situations. As an example, the cooperative experience of Mondragón can be considered, which is deeply illustrative in this sense: in its origins the population lacked basic social protection which was solved by the creation of the Lagun Aro Social Provision

Service that until the day of today it constitutes one of the pillars of cohesion of the group Mondragón and in fact between the services of this nature is leader in satisfaction of its clients [13].

## 5 Conclusions

The aim of this project is to achieve a coordinated, decentralized, democratic, adaptive, sustainable and efficient management of cooperatives in the province of Santa Elena, integrating artisanal fishing activities and possibly other sectors of production and services, as a means of articulating solidarity activities in the province of Santa Elena; in order to a sustainable and local development to be effectively constituted as a political strategy for the country's development, seeking not only macroeconomic goals for stability and productivity excellence, socio-economic goals should be set for the preservation of natural resources, the redistribution of social wealth and the reduction of social inequalities. As well as transforming solidarity economy into public policy, revolutionizing not only local structures, the emergence of a network that shelters all productive chains, from its origin and the chain of all phases, taking advantage of existing experiences.

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