ANALYSIS OF THREE FACTORS INFLUENCING THE PERFORMANCE OF FISHING COOPERATIVE ORGANIZATIONS OF YUCATAN, MEXICO

by

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ABSTRACT

The purpose of the study is to explore and understand the influence of several factors that potentially contribute to differences in performance of cooperative fisheries organizations in Yucatan State, Mexico. The three independent variables examined in this study, as influences on fisheries cooperatives performance are organizational issues, market structure issues, and the ability of cooperatives to adapt to external change. These factors were identified as potentially important for fisheries cooperatives performance in the region based on (1) my six-year experience working with these fisheries cooperatives as a fisheries manager in Yucatan State, and (2) a review of the relevant literature on organizational and economic influences on cooperatives performance. The performance of fisheries cooperatives, the dependent variable in this study, is expressed in two alternative ways. One, based on the judgement of members, uses the stated satisfaction of a cooperative’s member with its performance. A second approach for characterizing performance is based on the physical production of the cooperatives in terms of the average catch over a five-year period.

The central tool for data collection and analysis is a mixed-methods design that includes a survey, face-to-face interviews, personal observation, and secondary sources of information. I calculated non-parametric correlation coefficients (Spearman’s rho) between the independent and dependent variables. All correlations were statistically significant at the 0.01 level. These results support the predicted relationship between the variables, that is, that cooperatives with more operational rules, stronger market position, and higher adaptive ability are more likely to be have members more satisfied and to report higher catches. Multivariate analyses show that the most important variable influencing cooperatives’ performance is the number of operational rules, which in fact explain a little bit more than 70% of the performance variability, expressed as average catch per cooperative.

The results of the study are discussed in terms of their empirical support for social science theories, their contribution of new theoretical insights into the study of cooperatives, and the implications for the management of natural resources.
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CHAPTER I
GENERAL ANALYTICAL FRAMEWORK

I.1 INTRODUCTION

Resource management has been dominated until recently by natural scientists and economists despite the fact that management involves regulating human behavior. Historically, the main objectives of resource management were the conservation of the stocks, the economic efficiency of their exploitation, and the efficient allocation of those resources. In modern resource management, however, there is a major consideration for the “human dimension”. Consequently, the objectives have expanded to help ensure that economic benefits return to the communities from which local public resources have been exploited, and that such exploitation is done on an ecologically sustainable basis. Parallel to the redefinition and broadening of resource management objectives is the emergence of new stakeholders and the re-evaluation of the role of previous ones. Intergovernmental agencies and more recently, non-governmental organizations have emphasized organizational factors as important in promoting socially and biologically sustainable development (Caddy and Mahon, 1995). In addition, the reinvigorated participation of traditional stakeholders has been emphasized, such as the new position of cooperatives regarding the protection of the environment (Saxena, 1995).

Participation of the affected parties in the design of management policies is an expression of democracy. It implies the redistribution of authority that enables organizations to be included in the social, economic and political processes that affect them. They can, in turn, induce significant reforms that enable them to share the benefits of the exploitation of local natural resources. However, not all organizations can propose and induce such reforms. Several characteristics account for an efficient participation in the design of management policy. Organizations must be knowledgeable of the local resources (Holland, 1996), socially and economically homogeneous (Jentoft, 1989), committed to and experienced with rule-making, structured for democratic decision-making, flexible and able to adapt to external conditions (Nielsen and Vedsmund, 1999), and be steered by leaders with dynamic mental models for problem-analysis (Moxnes, 1998). If we want to encourage more successful organizations in resource management contexts, it is important to understand why some organizations are more effective in achieving their objectives than others.

Cooperatives are potentially one of the most important and yet most neglected stakeholders in the design of resource management schemes. Many studies have been conducted to show the benefits and limitations of cooperatives in the design of resource management policies and in improving members’ standard of living (Pettersson, 1980; McCay, 1980; Valdez-Pizzini, 1990; Jentoft and Sandersen, 1996). However, a number of studies have demonstrated that not all the cooperatives are successful in contributing to an efficient resource management (Poggie, 1980; McGoodwin, 1980; Poggie et al., 1988). Furthermore, some cooperatives limit their performance to technical operations without acquiring any direct responsibility in managing the resources that are the basis of their own survival. Thus, for researchers and policy makers, the question of why cooperatives perform differently, due to manifold factors is an important topic for research.

I.1.1 Importance of studying organizations and cooperatives

Organizations can be classified according to how they are incorporated within the legal structure of the nation-state, or the institutional environment. How they are incorporated refers to the ways by which organizations are made part of the nation-state, and hence how they are given certain rights and obligations. In this way, the state supervises how organizations operate and sets up regulations to
monitor those operations. Organizations in turn have discretion to act within legal structures and negotiate more favorable terms for themselves (Butler, 1991).

It is hard to imagine our existence without organizations. They are present in our life from our birth to our death. The hospital where we were born, the daycare and schools we attend, the companies that produce our clothes, build our houses or distribute food, the police that defend us from organized crime, and all of the other private agencies that provide us with the goods and services needed to carry out our modern life are organizations. At the national level, the government is the organization that regulates and coordinates our life in common with other people. Understanding more about the structure and operation of organizations could lead to a more informed insightful life with these organizations.

A cooperative is a type of “mutual benefit” organization that exists for the benefit of its members. The norms of performance in a cooperative often have a strong moral component. The institutional environment sets up regulations to ensure that the rules of association are kept, and there is no misappropriation of the funds. What makes a producers’ cooperative different from other mutual benefit organizations is that their production is commercialized in the market, so that the cooperative has some characteristics of a market organization. These features are competitive norms of performance, and operate under the supervision of official regulators, who ensure that the market remains efficient in terms of free flow of information, products and services. Cooperatives are important because they are economic organizations that reduce members’ uncertainty and lower transaction costs that would be faced by many individual operators. Transaction costs and uncertainty are due to an imperfect legal contract environment (Landa, 1979). Cooperatives also provide job opportunities to residents of communities in which they operate, reducing the need to seek employment alternatives in other areas. As a result, familial structure and kinship ties tend to endure more, reinforcing the overall community’s social structure. Finally, the cooperatives could be considered part of the “local implementation structures”, that is, the network of local actors that are directly involved with the delivery of official development policies (see Sabatier, 1986). Local involvement increases the legitimacy of policies among the people affected by it, and hence their support and compliance (Torres, unpublished document).

1.1.2 Purpose and overview of the study

The purpose of this study is to explore and understand how certain key factors contribute to differences in the performance of cooperative organizations, using fishing cooperatives of the Yucatan State, SE Mexico as a case study. The type of organizational structure, the ability to adapt to external disturbances, and the relationship established with other market agents were identified as important factors based on my six-year working experience as training coordinator in the research location, and according to the literature. The influence of those factors on cooperatives’ performance is analyzed in terms of their relative effect on satisfaction of cooperatives’ members and the average catch reported by these organizations during a five-year period. The study also develops categories for organizational structure, adaptive ability, and market position, to characterize the different strategies used by cooperatives to achieve their goals. The central tool for data collection is a mixed-methods design that includes a survey, face-to-face interviews, personal observation, and the analysis of secondary sources. The relationships among variables were characterized through qualitative and statistical analysis of the data. The results of the study are discussed in terms of their empirical support for social science theories, especially organization theory, their contribution of new theoretical insights into the study of cooperatives, and the implications for the management of natural resources.
1.1.3 Research questions
The fundamental question investigated in this study is why cooperatives perform differently when they have been established under the same governmental guidelines and legislation, and their function, at least theoretically, should be identical. Each cooperative has access to similar marine resources, and the market structure is comparable in practically all the fishing communities. At the level of the fisher, their fishing technological sophistication, the time spent fishing per year, their educational situation, and their fishing ability are very similar. However, based on personal observation after six years working experience in the study area, it was found that there were significant differences in the organizational structure of the cooperatives; the way they interact with intermediaries; how they have been adapting to social changes in their communities; to modifications to the legal framework, and to changes in the market structure due to the globalization of the economy. In investigating why cooperatives have evolved different organizational structures and, consequently, are performing dissimilarly, the intriguing question was why do cooperatives evolve alternate organization strategies when their objectives and goals are similar. Thus, this research addressed the generic issue of evolution of organizations rather than a comparison of changes among or between individual cooperatives. Comparisons were made across cooperatives to have a better understanding of the cooperative sector and to compare them relative to their organizational attributes and to their relationship with the surroundings. Analysis at the individual level regarding fishing efficiency, values and strategies for decision-making was peripheral and part of the context for selecting cooperatives.

Observed differences in performance among fishing cooperatives led to the following major research question: How do organizational factors, the ability to adapt and market factors affect the performance of these cooperatives? For each of the three factors identified in the overall question, I formulated secondary research questions. To understand the structure of the cooperative, it was necessary to know how operational rules, and organizational structures have developed over time, and how decisions are made concerning the adoption of these rules and structures. As for the ability to adapt, it was necessary to know what kind of dynamics exist between cooperatives and their social and economic surroundings, and what are the strategies to adapt to changes in these settings. Finally, to understand the market, I also considered what kind of relationship existed between cooperatives and market agents, and what were the strategies of cooperatives to deal with such agents.

1.1.4 Hypotheses
To guide interpretation of these research questions, I developed three operational hypotheses that represent particular predictions about the factors under analysis. The hypotheses were examined with straightforward statistical tests and qualitative analysis.

Hypothesis one
The larger the number and the variety of rules followed by a cooperative, the more successful is the cooperative.

Hypothesis two
The higher the adaptive ability of a cooperative, the more successful is the cooperative.

Hypothesis three
The stronger the market position of a cooperative, the more successful is the cooperative.

For each of these three hypotheses, success of a cooperative is measured in terms of the stated satisfaction of its members, and the size of its catch, which is a measure of economic success.
I.1.5 Definition of terms

In the interest of consistency, the following terms are defined for use throughout the study. Some other concepts are defined as they first appear in the coming sections and chapters.

I.1.5.1. Organization

A working definition of organization is that it is a social unity that has a purpose, boundaries, and patterns of members' activities in a recognizable structure. Organizations have physical assets and people doing tasks, taking raw materials, transforming them and distributing products to the market. An organization also entails the flow of capital and information for decision-making and coordination (Butler, 1991). Organizations plan social activities systematically through a set of strategies of how the activities can be organized to achieve the purpose of the organization. Activities are implemented using resources allocated to mobilize people who are coordinated by an authority system that organizes those activities.

I.1.5.2. Cooperative

A cooperative is defined as "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically controlled enterprise" (ICA, 1995). The definition emphasizes several important attributes of cooperatives. "Autonomy" means that cooperatives are independent of government agencies and market enterprises; "association of persons" embraces any legal definition of "person", which includes companies as well as individuals. "Voluntary" means that members are free to join and to leave at will. "Meet needs" is the central purpose of the cooperatives; needs may be economic, cultural, or social. "Joint ownership and democratic control" express the idea of members owning the cooperative on a mutual basis, and that decision is reached by consensus. "Enterprise" indicates that the cooperative is an organized venture that operates in the marketplace, and engages in the exchange of goods and services (Hoyt, 1996).

I.2 CONCEPTUAL FRAMEWORK

In the conceptual framework for this study, the factors influencing the performance of the cooperatives are the independent variables, whereas performance or organizational success is the dependent variable (Figure I.1). Prior and intervening variables are described for each independent variable in the following chapters of this study.

I.2.1 Independent variables

I.2.1.1. Operational rules

One important independent variable is the set of operational rules for cooperatives. Operational rules facilitate collective action for improving productivity and interpersonal relations to foster cohesiveness. Six operational rules are examined according to Ostrom (1992) and Buck (1989). Additional ecological rules are considered to explore the cooperatives' position regarding the condition of marine resources:

1. Eligibility rules, or the conditions to be, or not, a member of the cooperative
2. Decision rules, or the formulas used for decision-making in collective actions
3. Position rules, that is, the position members can hold within the cooperative
4. Payoff rules, or the rewards or penalties which may be assigned to actions or outcomes
5. Authority rules, or the authorized action members can take independently
6. Information rules, that is, the information that members should, or not, reveal to others
7. Ecological rules to interact with the biological environment
The “strength” of the rules is measured through an arbitrary counting system that assigns a value to a specific rule depending on its importance to facilitate collective action and personal interrelations. I explain the counting system in detail in the next chapter, which deals with the methodology for data collection and analysis.

1.2.1.2. Adaptive ability
A second independent variable concerns the cooperatives’ ability to handle external changes, that is, the ability of a cooperative to re-establish the equilibrium it had with the external environment when a disruption has occurred. Changes in the surroundings may create problems or offer opportunities to a cooperative. Yet, if it is incapable of reacting to those changes, problems may worsen and opportunities may disappear. Depending on the severity of external changes, cooperatives have to mobilize available resources or search for other ones in order to restore the balance with the external environment. Adaptive ability implies knowing how the groups adapt to the new circumstances, and how this adaptive power has lead to different performances. Adaptation requires a certain degree of flexibility in the rules, internal control for organizational development, and organizational learning capability. Also important, is the availability of financial and material resources necessary to implement adaptive actions. A categorical scale to measure different levels of adaptability is explained in the methodology section.

![Diagram](image)

**Figure I.1. Factors (independent variables) influencing performance (dependent variable) of fishing cooperatives**

1.2.1.3. Market position
A third independent variable is the market position of cooperatives. The position of the cooperatives in the market refers here to their role as producers of raw material. This role is related to the other market agents, or intermediaries, with which cooperatives have established a range of different relationships. These relationships affect cooperatives’ strength in influencing the prices they may receive for their production. The level of freedom to bargain depends in turn on the dependence that cooperatives have on specific intermediaries, and on the willingness of the latter to improve the operating conditions of the cooperatives. Thus, a cooperative has a stronger market position when it has more freedom to seek better prices and its dependence on other market agents is low. In some cases, the intermediary contributes to improve the efficiency of the cooperative. Market position is important because the development of cooperatives is often shaped by their financial dependence on
intermediaries (Acheson, 1981; Medina, 1988; Hartman, 1986). In general, dependent cooperatives have little chance to bargain over the price of their catches, and no opportunity to seek better prices with other buyers. Consequently, their capability to capitalize and reinvest in production factors is limited. On the other hand, cooperatives that have access to market information and control over the processing and distribution of their production have more options to negotiate better prices for their catches. In the methodology section I describe a scale of different categories to explain how market position is measured among cooperatives.

1.2.2 Reasons for using the independent variables

There are several practical and theoretical reasons to justify focusing the analysis on the influence of these three independent variables. The most important practical reason is that these variables appeared to be important during my six years working with these cooperatives. Another practical reason is that the federal legislative framework and the state government programs applied exactly in the same way to all cooperatives, which allowed me to assume that political factors’ influence is homogeneous to all cooperatives. Another practical reason to narrow the analysis to three variables is the limitation in both statistical and qualitative information about cooperatives and fishing communities in Mexico. Initially, I tried to explore the relationship between the performance of cooperatives and the social stability of their communities. However, during my fieldwork I found out that there was no statistical information available to assess the stability of the social structure of the coastal communities during any period of time. Consequently, I could not do this part of the analysis.

Turning to theoretical reasons, I followed the mainstream of the classic, neoclassic and modern structural organization theory concerning the interdependency between the structure and function of organizations. Although these theories analyzed organizations from different perspectives, which are explored in the theoretical framework, all of them recognize the importance of assessing the influence that each variable has on the other. The first step in the analysis of organizations is to understand their internal structure, lines of authority, units of control and coordination, and the operational rules that make the organization run. This understanding, however important, is not sufficient; it is also necessary to know the influence of the external environment on the structure and functioning of the organization, and how it responds to that influence. For this level of analysis, I relied on organization theories concerning the population ecology of organizations, whose major concern is the adjustment of organizations to changes in their environment and how it is affected by the decisions made by the organizations. I divided the external environment into separate elements for analytical purposes, and then I focused on the factor that, according to my experience, had the deepest impact on the performance of Yucatan cooperatives: market intermediaries.

1.2.3 Dependent variable

One of the main purposes of my study was to separately assess the association between three variables considered as independent and one variable defined as dependent. However, in the determination of the relationship between these variables, none of them can be considered as an experimental independent variable. Theoretically, the independent variable is a predictor of the dependent variable, but even if the data show a correlational relationship, they cannot be taken as definitive evidence of a causal relationship, that is, that changes in the independent variable causes variability in the dependent variable. There may be more factors that determine changes in the dependent variable. Moreover, the variable selected as dependent may influence the variable selected as independent. The definition of the variables depends on the objectives of the study, and for this case, the main objective was to characterize the influence of several factors on the performance of the cooperatives.

The performance was measured in two different ways. The first one is a subjective, constructed measure, namely members’ satisfaction. Satisfaction with the performance of the cooperative is an affective response to a cognitive evaluation of the performance. Thus, satisfaction, is a concept that
includes affective and cognitive dimensions (see Molm, 1991). The cognitive evaluation is contrasted against a prevailing criterion, the aspirational level, held by the members of the cooperative. If the cognitive evaluation yields a performance that falls below this level of aspiration, members would be dissatisfied with the performance of the cooperative. Therefore, several members may evaluate differently the performance of their cooperatives because they have a different level of aspiration. Members from less structured cooperatives with low records of catch may be more satisfied with their cooperative than members of highly productive cooperatives, because the aspirational level of the former is lower, thus low catches still represent a good performance for them. The other performance measure is a more direct, natural scale based on the average total catch reported by each cooperative from 1993 to 1997.

I.3 THEORETICAL FRAMEWORK

Traditional social and economic theories consider several decision-making units, such as companies, resource holders, governments, labor unions and political parties, which are important in explaining and predicting social and economic phenomena (Helmberger and Hoos, 1962). In coastal settings in Mexico, the cooperative organizations are an important decision-maker. There are, however, a few known methodological principles for the analysis of cooperatives. For instance, Helmberger and Hoos (1962) consider “that organization theory provides a broader interpretation of the firm that is useful for empirical research on cooperative decision making”. These authors go on to point out that a cooperative can be seen as a firm since it includes both persons and privately owned physical facilities. Also, cooperatives mobilize production factors, produce goods and service, and rely primarily on the proceeds from the sales to meet production costs.

The two basic differences between a cooperative and a profit-seeking firm are the motivations to be a member of each organization and the unit of control. In a firm, investors seek a high return of their investment and the control is centralized in one or few individuals. Conversely, members of a cooperative seek goods and services provided at cost and the unit of control is the whole cooperative. Helmberger and Hoos’ study is an exception in organization theory since most studies about economic and social organizations focus their analysis in private firms or large bureaucratic agencies (Butler, 1991; Hage, 1980; Cyert and March, 1988; Douma and Schreuder, 1998). Chen (1984) recognizes that using firm theory is not enough to explain the behavior of cooperatives, and that a broader interpretation of the firm is needed to understand differences among the two types of organizations.

The approach I adopted for the study of cooperative organizations is the “systems perspective” in modern structural organization theory. Under this perspective, a cooperative, as any organization, is viewed as an organized collection of parts united by prescribed interactions and designed for the accomplishment of specific goals (Boulding, 1956, quoted by Shafritz and Ott, 1992). Cooperatives are seen as a set of dynamically interconnected elements including their process, feedback loops and the environment in which cooperatives operate and with which they continuously interact. Structural organization theory differs from the classical theory because the latter developed a simplistic and mechanistic view of organizations, in which any organization could be managed according to general principles of management operating as ‘span of control’ (Simon, 1946). Neo-classical theorists, on the other hand, contend that organizations have a dynamic nature in which the organization and its members impact each other, some times in unpredictable and unforeseen ways (Shafritz and Ott, 1992). However, these theorists did not look beyond the organization’s boundaries to explore its relationship with the surroundings.

Organization can be examined as well at three different levels of analysis, that is, micro, meso and macro levels (Hage, 1980). At the micro level the unit of analysis is the manager, and the central concern is his or her influence on the design, morale, and efficiency of the organization. At the meso-
level, the organization is the unit of analysis, and the central concern is the structure of the organization and its efficiency. At the macro level the relationship with the extra-organizational environment is the unit of analysis; the main concern is with the larger economic, social, and political institutions that may influence the development of the organization. Although I recognize the importance of the leaders' personal styles in the development of the cooperatives, a microanalysis perspective was not adopted because it would have involved both psychological and behavioral analyses, which are beyond the scope of the present study. Therefore, the rest of the thesis focuses on the meso and macro levels of analysis.

In modern structural organization theory, the structure means relatively stable relationships among the positions, areas, and work processes that make up the organization. The theory deals with hierarchical levels of authority and coordination, and horizontal differentiation between organizational areas. It is also concerned with the same issue as classical theory; the goal of organizational rationality is to increase the production of wealth in terms of real goods and services. However, there are three basic assumptions of the modern structural theory (Bolman and Deal, 1984) that make it different and on which I based my analysis of the meso and macro levels.

1. Organizations are rational institutions whose primary purpose is to accomplish established objectives. Rational organizational behavior is best achieved through systems of defined rules and formal authority. Organizational control and coordination are key for maintaining organizational rationality.

2. There is an appropriate structure for any organization in light of its given objectives, the environmental conditions surrounding the organization, the nature of its products and/or services, and the technology of the production processes.

3. Many problems in an organization result from structural flows and can be solved by changing/adjusting its structure.

The first assumption implies that traditional patterns of hierarchy, well-defined rules, vertical lines of communication, and structured decision-making are present at the meso (organizational) level. I examine this assumption first, emphasizing the presence of several operational rules, different organizational structures, and various decision-making situations and structures. The second and third assumptions denote dynamic conditions in which the environment changes rapidly and the cooperatives adapt to the best structure possible according to these changes. The study focuses then at the macro (environmental) level emphasizing different adaptive responses depending on several organizational structures.

The macro level analysis is important because understanding only the inner control and coordination of an organization is not enough to understand its true nature. Organizations cannot exist as self-contained entities isolated from their environment. Organizations are not static; they are dynamic, changing constantly to different states of equilibrium. They should be adaptive systems integrated to, and influencing their environment (Shafritz and Ott, 1992). To facilitate the analysis of the changes in the external environment and the adaptive responses by the cooperative organizations, the environment is divided into major market, social, legislative, financial and biological components.

The final component of my study is also at the macro level, but focused on the market element of the surrounding environment. I chose specifically to analyze the influence of intermediaries on the performance of the cooperatives, because it is the main extra-organizational force determining the development of this type of organization in the study area. The broader theoretical perspective that I
have used to carry out this analysis is social exchange theory (Befu, 1977; Molm, 1991). However, more specific approaches are examined as well, such as the relationship of buyer-supplier (Lilliecreutz, 1998; Krause, 1997; Krause, 1999); and satisfaction and power within that relation (Molm, 1987; Molm, 1991). These theoretical perspectives are intended to explain how the market influence operates, and to predict what level of organizational performance may be reached given a certain level of influence.

I.4 CONTEXT FOR ANALYSIS

To provide some context for the analysis, this section describes the general social, economic and political conditions under which cooperative organizations operate in Mexico. Subsection I.4.1 provides an overview of the fisheries in Mexico and Yucatan, and a description of the general characteristics of the fishing market and communities, which help to explain the relationships established between cooperatives and the intermediaries examined in Chapter V. Subsection I.4.2 describes the organizational structure of the cooperatives as defined by the Mexican legislation. This legal organizational structure is the basis of understanding different types of organization described in Chapter III. The subsection also briefly examines the events that have determined the evolution of cooperatives; this evolution is important to understand how cooperatives have adapted to different environmental changes during their historical development. Changes and adaptations are analyzed later in Chapter IV.

I.4.1 Overview of the fisheries in Mexico

Mexican fisheries have had a low priority in terms of national economic development. In the period from 1993 to 1997, the contribution of fisheries to the GDP was less than 1.0% (INEGI, 1998). Many factors have contributed to this situation. One of them is the uneven geographical development of fisheries. The four states in the North Pacific coast (Fishing Zone I) contribute up to 65% of the national catch. The four states in the Gulf of Mexico (Fishing Zone III) and one other state from the Fishing Zone IV, contribute another 20% of the total production. The remaining 15% are reported by other 23 states. The concentration of fish production is followed by a concentration in the catch composition: in the same period, 69% of the total catch (in weight) was made up of only 10 species, whereas more than 26 species comprised the remaining 31%. Among the most important species were tuna, sardine, shrimp, porgy, and squid. Harvesting in the Mexican fisheries is predominately at a small-scale level, since 97% of the more than 100,000 boats complete daily trips close to the coast. The value of the total catch in 1997 was about $1.2 billion USD (Ministry of Environment, Natural Resources and Fisheries, SEMARNAP, 1999).

One key reason why fishing activities have had a low priority in the development of the country, is that the economic transition pursued by the Mexican government since the 1940 emphasized a shift from an agricultural to a semi-industrialized economy. Consequently, the federal government has directed its programs to those sectors of society that are considered socially, economically and politically important. Using the Gross Domestic Product (GDP) as a basic measure of the aggregated economic activity, the services sector (commerce, transportation, communication, and financial and personal services) has accounted for more than 50% of the GDP since 1950. The most dynamic sector has been heavy industry (manufacturing, construction, electricity and petrochemicals), whose participation increased from 21.5% of the GDP in 1950 to 27.7% at present. On the contrary, the primary production sectors (agriculture, cattle raising, forestry and fishing) decreased in their contribution to the GDP from 19% in 1950 to 8% in 1985 (Lustig, 1992).
1.4.1.1. Overview of the fisheries in Yucatan
Fisheries in Yucatan State, located in the middle of Fishing Zone IV, parallel what is found at the national level. The catch is largely made up of three species: lobster, grouper, and octopus, which represent up to 80% of the fish state production. There are, however, more than 25 species with commercial value. Artisanal boats dominate the fleet with roughly 90% of the units suited for coastal fishing only (SEMARNAP, 1998). Fishing cooperatives represent approximately 15% of the fishers, 20% of the small-scale boats and report only 12% of the total catch. Consequently, private firms own 71% of the State's small-scale fleet and 85% of the commercial vessels. In the last decade, 86% of the catch was reported by the private sector, although the private sector processed and traded practically the entire State production (Salas and Torres, 1996).

1.4.1.2. Fish marketing in Yucatan
Fishing cooperatives in Yucatan operate in an imperfectly competitive market, dominated by oligopsonistic competition. A small number of buyers and a larger number of sellers, whose product is homogeneous, characterize this type of market competition (Blomquist et al., 1990). A distinctive feature is that local fish buyers are aware that their buying strategies affect each other, which influences prices and creates mutual interdependence among them. Cooperatives as sellers, in turn, may have preferences for dealing with particular buyers. Some others actually seek buyers outside the region to obtain higher prices. In both situations, cooperatives can influence prices at least at the community level; the cooperatives actually buy their members' catch to sell it and redistribute the income equitably. If the price offered by the coop were higher than the one proposed outside the group, non-members would be attracted to sell to the cooperative, obliging other buyers in the community to increase their prices in order to ensure their supply.

1.4.1.3. Characteristics of fishing communities
There are fifteen fishing communities in Yucatan. They can be grouped in three different types, based on Schnore's classification (Schnore, 1967), which emphasizes levels of production. Twelve are primary communities, in which the main production is extractive, and the environment is a source for the extraction of raw material. The other two are secondary communities, which practice secondary as well as primary activities: the main production is manufacturing and processing extracted raw materials. Finally, there is one tertiary community, which develops primary, secondary and all of the activities that consist of distribution of raw materials and processed goods, and services, such as financial, communication, and recreation. Although not located on the coast, the capital city is considered as a tertiary community as well, since fishing products are concentrated, processed and exported from there. Figure 1.2 shows the seven coastal communities where fishing cooperatives are distributed.

In the primary communities there is not a noticeable physical separation of activities and inhabitants; segregation is minimal since the population is fairly homogeneous, and the activities carried out are highly similar. There is little spatial differentiation because fishermen concentrate in a central cluster of dwellings and travel a short distance to peripheral places each day where their boats are docked. The tertiary communities are considered the centers of fish processing and trading, as well as for manufacturing goods and providing services. The occupational heterogeneity is related to a higher social differentiation and stratification, and to their larger population density. The two secondary communities' social structure rests between the two previous categories.
Figure 1.2. Geographical distribution of primary (S=Sisal, SF=San Felipe, RL=Rio Lagartos, and EC=El Cuyo), secondary (C=Celestun and DB=Dzilam Bravo), and tertiary (P=Progreso) communities in Yucatan.

The relationship between the tertiary and the other two types of communities on the coast can be described using a regional analysis framework (see McCann, 1987). Tertiary communities are characterized by their accessibility to extra-regional markets and their diversified profile of industries, as well as by their high urbanization and concentrated population. These communities are able to influence the economic, social and political decisions of regional importance. On the other hand, the other coastal communities are highly dependent on the exploitation of primary resources; thus, they are regarded only as providers of raw material. Their urban systems are weakly integrated and have a restricted political expertise; these communities have limiting physical characteristics such as roads and processing facilities. Consequently their ability to gain access to extra-regional markets depends on the facilities and services located in tertiary communities.

1.4.2 Development of the cooperative sector

Because of increased exploitation of Mexico's fishing resources by foreign fleets and companies, at the turn of the twentieth century the Mexican government tried different ways to restrict further expansion of those enterprises. Simultaneously, measures were taken to promote the development of Mexican fishing companies and to create a stable and organized labor force able to harvest national fishing resources. To support these actions, the Mexican government created a legislative framework in 1925; a Fisheries Law recognized state control over fishing resources and its right to regulate their exploitation. On this basis, preferential access to fishing permits was given to national firms and specific restrictions were placed on the operation of foreign vessels in Mexican waters.

1.4.2.1. Cooperatives' organizational structure

Cooperatives may have different organizational structures to achieve their objectives. Grouping units inside the cooperative facilitates the identification of levels of decision-making, channels of communication, allocation of resources, and lines of authority. Some cooperatives are organized by
function, where different phases of the fishing process are managed separately, such as harvesting, processing and marketing. Other cooperatives are organized by product, with each unit specializing in different commodities. Marketing may be another way of dividing the structure of the coop, each division focusing on local, regional or international markets. Furthermore, the specialization of the units can be directed to different types of customers, such as small buyers, large companies or government trading agencies.

According to the Mexican law of cooperatives, active cooperatives of producers in Yucatan must be organized in a manner combining three different types of structures: line, staff, and committee, as shown in Figure 1.3. The line structure establishes direct vertical links between different levels of decision-making, and it should represent a clear authority structure. The highest level of authority is the general assembly composed of all the members. Assemblies are held at least once a year. The administrative council, which executes the assembly agreements, represents the next level, and different committees are at the lowest level of authority. These committees are groups of members formally elected every five years by the general assembly to consider or decide on certain matters. Committees can be permanent or temporary and usually supplement line and staff functions. The staff structure implies that non-members with certain skills and knowledge are added to the organization to advise or support the decision-making level. These people can be bookkeepers, secretaries, advisers, or technicians.

![Figure 1.3. Organizational structure of fishing cooperatives in Mexico](image)

There are 35 fishing cooperatives registered in Yucatan State, mostly operating at the small-scale level. Membership ranges from 15 to 211 fishers. Fishing is carried out using fiberglass boats, ranging in length from 24 to 35 feet; fishing trips last 8 to 12 hours a day. Main species caught depending upon their availability and economic value are octopus, grouper and lobster. Fishing gears comprise nets, semi-autonomous diving, a local gear made of bamboo sticks, and long line. Most of the cooperatives lack administrative skills. The cooperatives and their members focus on harvesting of the marine resources. Cooperatives do and promote limited processing of the catch, leaving this activity to the
intermediaries. Only 3 of the cooperatives process and trade their catches directly to the market. From the total catch registered in Yucatan from 1993 to 1997, cooperatives' participation was 8.2% in biomass and 10.4% in economic value.

Members of cooperatives in the middle and West areas of the coast are full time fishermen, whereas members of the East Coast cooperatives fish from 8 to 12 months per year. They combine their fishing with some ranching, especially when the weather is not appropriate for fishing. Members' age ranges from 16 to 70 years old, 75% of which are 25 to 50 years old, and years of fishing experience ranges from 2 to 49 years. 90% of members have only elementary education. Family size of members is from 2 to 6 people.

1.4.2.2. Inception
The cooperative sector was initiated in 1934. This was a significant period in Mexico, in which state interventions in the economic life of the country emphasized nationalist yet populist measures designed to reinforce the government's political alliance with the peasantry, as well as the working and middle classes. Interventions included the establishment of the Federal Law of Cooperatives, and the provision, over a period of years, of the reservation of a number of commercially valuable marine species, including shrimp, oyster, and lobster, for exclusive exploitation by Mexican fishermen organized in cooperative organizations. The central purpose of the legislation was to counter the weaknesses of the private fishing sector by organizing a cohesive labor force and facilitating private investments in large-scale, capital intensive outfits (Buckles, 1984).

1.4.2.3. Current situation
The Mexican government has faced conflicting interests in the development of the fishing industry. From the 1930's through the 1950's, the state fostered and emphasized the collective use of marine resources and its commitment to equity by setting up cooperatives and giving them exclusive exploitation rights over these resources (Vasquez-Leon, 1995). This orientation changed from the 1960's to the mid 1980's, when the government pursued its commitment to fostering national economic growth by allowing private investors to obtain substantial benefits from the fisheries through the renting of boats, equipment, and processing facilities to cooperatives. At the same time, the government dismissed equity concerns by consigning the cooperative sector to its legal base and in fact doing little in the way of promoting its development (Hernandez, 1988; Mendoza, 1985). The most recent and dramatic change in the fishing policy started in 1992 with the gradual transfer of harvesting rights and control over all phases of production and distribution of fish-based products to private investors.

1.4.2.4. Perspectives
The most important legal access that cooperatives have to fish resources is a concession, which is a fishing license that lasts from 5 to 20 years, with the possibility of renewal. Unlike the concession in
previous versions of the law, this legal instance is now transferable. To put it briefly, the most recent version of the Fisheries Law (1994) reintroduced natural resources as private property, with the advantage of being legally secure for a longer period of time. In addition, the concession is transferable and can be sold (Villamar, 1994). As result of these measures, the goal of gaining economic efficiency through the privatization of fishing resources, the possibility of mercantile exchange, the official deregulation, and the freedom of market forces are factors that are operating in, and will determine the fishing development in Mexico. Defining private property rights in this way, the concession as commodity, has at least three consequences. The first one is the weakening of the cooperative sector, since private, powerful investors willing to exploit fishing resources more efficiently may eventually displace the cooperatives. The second consequence relates to the first one in the sense that the displacement might mean lack of employment and a struggle for subsistence to thousands of fishers. The third one relates to the ecological costs of privatization, which might be high in achieving such an economic efficiency, as it has occurred in many fisheries around the world.

1.5 LIMITATIONS AND SIGNIFICANCE OF THE STUDY
At least two limitations merit discussion in this study. The first one is the ontological question of "What is reality?" The qualitative nature of the study determines that reality is constructed by the individuals involved in the research situation (see Creswell, 1994). Therefore, the findings could be subject to interpretations different from mine. I tried to minimize this shortcoming by reporting precisely the opinions and definitions of the informants.

The other limitation is related to the survey design I used to collect information. It is known as 'static group comparison design', and aims to explain and interpret relationships among variables across comparison groups (Creswell, 1994). I categorized the various comparison groups (cooperatives), using the values of the selected independent variables. By comparing the corresponding dependent variable scores, it was possible to assess whether there is a relationship between the variables. However, there is the possibility that other independent variables between two comparison groups not considered here might also affect the dependent variable. Such independent variables are alternative explanations for different dependent variable values. Another aspect of this design is that it enables one to meet only the first criterion for deducting causation, that is, the correlation between variables. The other two criteria for causation are that the independent variable precedes the dependent variable in time and that there are no alternative explanations of the group differences in the dependent variable.

The significance of this study for other researchers includes identifying the necessity of designing further studies to address this shortcoming and meet these two criteria of causation. One study would have to be longitudinal to meet the time-order criterion, taking into account changes over time by collecting data in two or more periods. Another study should be a cross-sectional design to meet the third criterion by using variables to represent phenomena that explain the differences among groups that have occurred over a period of time. One aspect of the significance of this study for researchers includes the novel use of survey methodology and the various social theories used for studying cooperatives. For fishery managers, the study is important because it points out deficiencies in the local adoption of unknown and sometimes adverse management schemes devised by centralized public agencies. It also exhibits the necessity of creating strategies for freeing the cooperatives from social and economic constraints during the market exchange. The study also identifies some factors that would be promoted and some that should be discouraged if improving the performance of cooperatives is considered as an objective in fisheries development.
Finally, there is an obvious significance of the study to my professional development. I understand that reporting the correlation between variables is not sufficient to understand a phenomenon, and that describing it is not necessarily an analysis. I have tried to make this study meaningful by putting it in the largest context of the fishery in Mexico and its management, and by finding patterns of occurrence of key variables. My intention is to know the cause of this occurrence to improve the existing operating conditions of cooperatives and to propose solutions to several practical problems. I also understand that theories are at best a simplification of a highly complex reality. But the first way to start dealing with this complexity is by confronting it with one's theories, however simple, in a continuous and dialectic way that may enhance the understanding of our reality.

1.6 ORGANIZATION OF THE THESIS
The thesis is organized in seven chapters. This chapter has outlined the general conceptual, theoretical, and operational frameworks to set the general context in which the cooperatives operate in Mexico. Chapter II describes the methods used for data collection and qualitative and statistical analysis. It describes how independent variables were measured and how classification schemes of cooperatives were developed. Each of chapters III to VI consists of a brief introduction, specific research questions and a hypothesis. Particular details complementing the methodology described in Chapter II are also included. Results for each variable are discussed in order to address and answer the research questions. The purpose for this design is to emphasize the analysis and findings relevant to each factor affecting cooperatives’ performance. In this way, operational rules are analyzed in Chapter III, the adaptive ability is investigated in Chapter IV, whereas the market position is examined in Chapter V. Chapter VI provides a statistical analysis of the three independent variables together to disclose their potential combined influence on the performance of the cooperatives. The last chapter provides general conclusions about all the variables analyzed, emphasizing the implications of the study for the management of fisheries in Mexico.
CHAPTER II

METHODS

II.1 INTRODUCTION
This chapter outlines the methods used to collect and analyze the information needed to answer the research questions. The approach is the combination of quantitative and qualitative methods because certain methods are more appropriate than others for a specific situation within a single study. This mixed-methodology design allowed me to combine methodological steps at several phases of the data collection-analysis process. For example, the survey is a quantitative method of data collection; this information is then analyzed through statistical tests to generalize from the sample to the population. On the other hand, interviews, documents and observations are qualitative methods for collecting data. The analysis of the information obtained provides the basis for developing categories from particular sets of information, and developing a qualitative narrative that shows patterns for that information (Creswell, 1994).

The study locations were seven fishing communities in the coast of the Yucatan State, in the southeast of Mexico. The case study focused on 21 small and large-scale fishing cooperatives grouped in two separate federations. 12 Small-scale cooperatives were those operating fiberglass boats no more than twenty-seven feet in length and which have the capacity for one-day trips. Average catch did not exceed 100 Kg/day. On the other hand, 9 large-scale cooperatives operate vessels ranging from thirty-five to sixty-five feet in length, which are capable of carrying out trips of two to four weeks. Average catch is variable, depending on the gear and the deck capacity, but usually is above 150 Kg/day. Information from the field offices of the Ministry of Fisheries, the federations and the cooperatives related to the number of cooperatives and membership, was contradictory. However, it seems that there were about 35 cooperatives operating with approximately 1,500 members, which represents approximately 10% of the total number of fishermen in Yucatan.

II.2 SOURCES OF INFORMATION
Four different methods for collecting information were used during the summer of 1998 in the study location. The methods were:

- A semi-structured, open-ended interviews complemented with personal notes
- A survey based on closed-ended questionnaires
- Occasional observational notes, taken as an observer (not as participant)
- Analysis of public documents

Two different protocols were devised for the interviews and the survey. The interview protocol covered descriptive and reflective components (open-ended questions) in which informants provided specific information and were allowed to expand their points of view for each question (see Appendix A). Interviewees were the members of the boards of directors for each of the 21 cooperatives. The resulting data were used to classify the independent variables, that is, operational rules, adaptive ability, and market position. I took reflective notes after the interviews to record my
own thoughts and impressions; interviews also comprised a demographic component to record the ‘age’ of the organization, number of members, number of boats, and the like.

The questionnaire protocol also included descriptive and reflective components, in which informants were allowed to elaborate an explanation of why they were (dis)satisfied with the performance of their cooperatives in different aspects. These aspects included the relationships with fish buyers, communities and authorities; the performance of the cooperative in getting loans, training courses, and technical support; its ability for searching for technological innovations, lobbying and bargaining, and others (see Appendix B). Through a satisfaction scale based on Likert’s scale (DeVellis, 1991), where 1=very satisfied and 5=very dissatisfied, an average overall satisfaction measure was estimated for each cooperative.

The process of asking questions to members of the cooperatives, allowed me to build a numeric characterization of the sample from the target population. The survey design allowed me to generalize from a sample to the population and make inferences about the occurrence of some organizational characteristics of this population (see Creswell, 1994). The survey I used in this study was a special case of a cross-sectional design called ‘static group comparison design’ survey. It was cross-sectional because the information was collected at one point in time, but differed from standard cross-sectional designs because it compared groups only once, based on one or few criteria. One advantage of the survey was that, as a non-experimental research method, I was able to define which variables were independent and which dependent. This characteristic played an important role in deciding the methods applied for data analysis. Other advantages were (1) it was relatively easy and cheap to design the survey and to collect and organize the information; (2) it was also relatively simple to identify attributes of a population from a small group of members of that population.

Practical considerations were also important in deciding which survey design to use. The data collection procedure was convenient because it was cheaper to visit the fishing communities in Mexico than to request the information by telephone from Canada. I also had to consider the fact that members of the cooperatives are still not used to telephone or mail interviews, in which case a high rate of non-respondents would be expected. Finally, being in the communities meant it was convenient for me to invite fishermen to participate in the survey and to randomly select them on site. Table II.1 shows which survey items were used to answer the research questions.

The final source of information was catch reports obtained from the same cooperatives and from the offices of the Ministry of Fisheries. I analyzed the catches per month and per species as reported by each cooperative from 1993 to 1997. Then I calculated the total average catch during that period.

II.3 THE SAMPLING PROCESS
The sampling process covered many steps from defining the target population to actually choosing the sample. The sampling process was designed to select the sample to which the questionnaire was applied. The process was developed following steps outlined by Czaja and Blair (1996) or as noted.
II.3.1 The target and study populations

The target population was the group to which the results of the study could be generalized. In this case, the target population included all 1,500 members of the thirty-five fishing cooperatives in Yucatan. The study or survey population was a subgroup of the target population from which respondents were selected to answer the survey. The boundaries of the units of analysis delimited the study population. The unit of analysis in this case was the fishing cooperative, and the boundaries regarded as important were the following:

- Legal: the Law of Fisheries and the General Law of Cooperatives define this boundary, and excludes other types of fishing organization.
- Geographic: Cooperatives were selected from the seven fishing communities along the coast of Yucatan where these groups are located.
- Cooperatives’ age: Only groups with more than five years operating in the study area were chosen. Two important exceptions were made; two cooperatives started operations in 1996 as cooperatives, but they have been operating under different legal denomination since the beginning of the 1990s.

These boundaries narrowed the study population to twenty-one fishing cooperatives, identifying automatically the sample for the interviews with the boards of directors.

Table II.1

<table>
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<th>Research questions</th>
<th>Survey items</th>
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<td>Interviews</td>
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<td>- Operational rules</td>
<td>- Operational rules affect performance?</td>
<td>- Questions 1-19</td>
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<tr>
<td>Dependent</td>
<td></td>
<td>Complete questionnaire</td>
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<tr>
<td>- Level of satisfaction</td>
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II.3.2 Sampling design and size

The sample design applied to estimate the number of members to assess their satisfaction was a simple multiple-stage sampling design that comprises a two-stage sampling process. In both stages, I used a simple random sampling technique. The first stage involved a random selection of groups, in this case the cooperatives, and the second stage involved the random selection of members of the selected cooperatives to produce the final sample. This multistage approach required trade-off between improved precision of the sample estimates and higher complexity. As the number of stages increases, the precision decreases. Having only two stages reduces the difference between
estimates of statistics and parameters, and thus increases the reliability of the inferences from the sample to the population (Czaja and Blair, 1996; Henry, 1990).

The sample selection within each cooperative was independent and guaranteed an equal probability of selection to all its members. Since the probability of selection is determined by the cumulative probability of selection, unequal probability of selection in the first stage was compensated in the second stage. From the cooperatives selected in the first stage, the sample size in each was estimated with the probability proportionate to size, PPS, (Henry 1990), because cooperatives have different sizes of membership.

The cooperatives selected in the first stage are referred to as Primary Sampling Units or PSU, and the purpose of applying PPS was to give similar probability to any member of any cooperative to be selected in the sample. The formula to calculate the sample size at this stage was:

\[ p = c \times \frac{N_c}{N} \]

where
- \( p \) is the probability of selection
- \( c \) is the number of PSU (cooperatives)
- \( N_c \) is the number of elements in each PSU
- \( N \) is the total number of elements in the study population

Whereas \( N_c \) was obtained from each cooperative, \( c \) was calculated directly as 60% of the total number of cooperatives registered in Yucatan. This arbitrary first stage sample size yielded twenty-one cooperatives, which were selected from the seven fishing communities based on the convenience to sample them according to their distribution. Thus, eight cooperatives were selected directly because they were located in five communities, making it easier to sample them. Four more cooperatives from another community were selected based on their availability since I did not know which ones were still operating and what was the chance of contacting the members. The remaining nine cooperatives were selected from the last community where fourteen cooperatives operate.

Because the sample sizes of cooperatives with more than one hundred members were extremely large, I adjusted them by re-estimating the probability of selection with an arbitrary weighing factor (\( wf \)). It was calculated as the probability of selection calculated from the PPS, divided by the same probability times ten:

\[ wf = \frac{p}{p \times 10} \]

This procedure yielded a probability of selection of 0.1 for these cooperatives. The criteria to choose this adjusting factor were to calculate a new probability of selection less than 10% or to have sub-sample sizes around twenty members of less. The samples for larger cooperatives were recalculated with this correction factor. The total sample size was estimated as 164 members as a target, based on these criteria. Due to the presence of non-respondents, the real sample size was 155 members from sixteen cooperatives. The real sample size represents 94% of the adjusted
sample, and 14% of the total membership in the study population, and also reveals the non-
respondent cooperatives. Table II.2 summarizes the sample sizes per cooperative, original, 
adjusted and real.

II.3.3 The sampling frame
The sampling frame is the list(s) or resource(s) that contain the members of the study population. 
This frame was defined from three different yet related types of lists: official records managed by 
the Ministry of Environment, Natural Resources and Fisheries, records from the most recent 
ordinary assembly, and updated members' list supervised by the boards of directors. By combining 
these three lists it was possible to compile the most recent list of the cooperatives' members. It was 
important that the definition of the target and study population is clear so all or most members of 
the study population were members of the target population as well. In this way, differences 
between study population's statistics and target population's parameters (non-sampling bias) were 
reduced; inferences from the sample to the population were, therefore, more reliable (Henry 1990).

<table>
<thead>
<tr>
<th>Cooperative ID</th>
<th>No. of members</th>
<th>Probability of selection (PPS)</th>
<th>Sub-sample size</th>
<th>Sub-sample size adjusted</th>
<th>Real sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLP</td>
<td>56</td>
<td>1.0</td>
<td>56</td>
<td>6</td>
<td>n.r.</td>
</tr>
<tr>
<td>SF</td>
<td>207</td>
<td>3.8</td>
<td>793</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>DB</td>
<td>99</td>
<td>1.8</td>
<td>181</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>TPM</td>
<td>22</td>
<td>0.4</td>
<td>9</td>
<td>9</td>
<td>n.r.</td>
</tr>
<tr>
<td>PS</td>
<td>12</td>
<td>0.2</td>
<td>3</td>
<td>3</td>
<td>n.r.</td>
</tr>
<tr>
<td>CA</td>
<td>18</td>
<td>0.3</td>
<td>6</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>PG</td>
<td>53</td>
<td>1.0</td>
<td>52</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>CP</td>
<td>211</td>
<td>3.9</td>
<td>824</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>EC</td>
<td>118</td>
<td>2.2</td>
<td>258</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>RL</td>
<td>160</td>
<td>3.0</td>
<td>474</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>CCB</td>
<td>20</td>
<td>0.4</td>
<td>7</td>
<td>7</td>
<td>n.r.</td>
</tr>
<tr>
<td>PD</td>
<td>15</td>
<td>0.3</td>
<td>4</td>
<td>4</td>
<td>n.r.</td>
</tr>
<tr>
<td>CPP</td>
<td>24</td>
<td>0.4</td>
<td>11</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>PI</td>
<td>15</td>
<td>0.3</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>DP</td>
<td>15</td>
<td>0.3</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>PII</td>
<td>12</td>
<td>0.2</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PC</td>
<td>15</td>
<td>0.3</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>PCH</td>
<td>15</td>
<td>0.3</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>NK</td>
<td>15</td>
<td>0.3</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>EC</td>
<td>18</td>
<td>0.3</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>B</td>
<td>15</td>
<td>0.3</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,135</strong></td>
<td></td>
<td><strong>2,655</strong></td>
<td><strong>164</strong></td>
<td><strong>155</strong></td>
</tr>
</tbody>
</table>
II.3.4 Choosing the sample

There were four steps to generate a list of respondents to assess the level of satisfaction. First, from the complete list of members of each cooperative, the sub-sample size was identified. Second, the identification number assigned by SEMARNAP to each fisherman was used to select him randomly. In doing so, the last four digits of the identification number were compared with the last four digits in a random number table. Random numbers were automatically generated using standard computer routines. In the third step, each member whose identification number matched a number in the random table was selected as respondent. The process was repeated, without replacement, until the number of members necessary to complete the sub-sample size was obtained. Some more individuals were further selected to replace possible refusals or individuals that for some reason were unable to answer the questionnaire. Finally, with the help of the board of directors, the selected members were notified and told the time and place to administer the questionnaire.

The process was easier in six of the communities with small-scale level of harvesting. In the remaining community, the largest one, where all of the members usually carry out two to three week trips on industrialized ships, having the selected members at the same time was very difficult. In fact, it was not possible to apply the questionnaire to three cooperatives in that community. This situation, known as non-response bias, created differences between the study and target populations. The omission of this group of respondents from the data collection was not random thus creating a bias in the results.

II.3.5 Non-response errors

In order to prevent and reduce non-response errors during the survey, I took preventive measures according to two types of error. The unit non-response error is related to respondents, therefore gaining fishers’ trust from the beginning was essential to get their participation, especially with inefficient cooperatives that tended to be distrustful and blame their failure on “outsiders” in general. Thus, being honest and clear about the purposes of the study was very helpful to make fishermen more willing to participate in the survey. In the case of the three cooperatives mentioned above, I tried different strategies and times to contact them and thus reduce this type of error; however, they were never willing to participate in the survey.

In the case of item non-response error, two measures were equally important. The first one was carefully designing a set of questions that were not harmful, especially in sensitive issues, such as giving an opinion about the board of directors. The second one referred to assuring fishermen that the information they provided was both necessary and confidential. These measures were necessary to reduce as much as possible errors due to the lack of information either because respondents were not able to answer the questionnaires, or because the questions were unclear or threatening. The idea was to devise a routine, secure procedure to get fishermen’s cooperation in answering all or most of the questions.

II.4 PRETEST AND CODE-BOOK

This section describes the questionnaire pretest and the elaboration of a codebook for entering information from the questionnaires and interview protocols into computerized databases.

II.4.1 Questionnaire pretest

The first draft of the questionnaire was distributed among ten peers for review and comments. Considering that most of them did not know anything about fisheries in Mexico, they were asked to
focus on format and clarity. Therefore, the details most frequently pointed out were concerning the widening of the measurement scales to 5 or 7 attributes containing a very positive and a very negative ends, wording with understandable concepts, and including the “Missing/refuse” category. A second pretest was carried out in Yucatan, once the questionnaire was translated into Spanish. On this occasion the reviewers were three technicians with ample-working experience at the coast of the state. The focus at that time was on wording, clarity and timing. Since the technicians knew the style in which people speak Spanish at the coast, their suggestions were helpful to make the questions understandable. A thirty-minute time frame was estimated to answer all the questions. The technicians mentioned that the sequence of the questions was logical and clear, so it would be easy for the fishermen to follow the questionnaire.

II.4.2 Code-book

I developed separate codebooks to enter responses to the questionnaire and the interviews, and to process and analyze the information. A sample codebook is shown in Table II.3.

Table II.3.
Section of the code-book designed to process the information from questionnaires and interviews

<table>
<thead>
<tr>
<th>Question number</th>
<th>Variable name</th>
<th>Variable label</th>
<th>Value Label</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ident.</td>
<td>Identification number</td>
<td>Person 1… Person 100</td>
<td>001… 100</td>
</tr>
<tr>
<td>1</td>
<td>Managsty</td>
<td>Satisfaction with management style</td>
<td>• Completely satisfied • Mostly satisfied • Mixed • Mostly dissatisfied • Completely dissatisfied • Refused/missing</td>
<td>1 2 3 4 5 9</td>
</tr>
<tr>
<td>2.a</td>
<td>Fisbuy</td>
<td>Evaluation of dealing with fish buyer</td>
<td>• Excellent • Very good • Good • Fair • Poor • Refused/missing</td>
<td>1 2 3 4 5 9</td>
</tr>
</tbody>
</table>

The first column refers to the progressive numbering of the questions in the protocols. The “variable name” column represents the column’s head in the database screen and the SPSS program uses it in all the statistical tests; the variable name has to be shorter than 8 characters. The “variable label” column represents the complete variable name and is used to label the variables in the outputs (graphs and tables). The value label and value columns show the variables’ categories and their values from the questionnaires. For instance, satisfaction was ascertained by directly asking members their opinion about different aspects of the cooperatives’ management; in this case, categories ranged from “Completely satisfied” to “Completely dissatisfied”. Each of these categories has a corresponding numeric value, which was assigned by the researcher. “Completely satisfied” had a value of 1, while “Completely dissatisfied” had a value of 5. The values were used to estimate an average overall satisfaction for every cooperative, considering the total answers of each member.
II.5 INSTRUMENTATION
Instrumentation refers to the characteristics of the tools used during the data collection. First, the survey questionnaire and interview protocols were self-designed because there were no previous experiences in the study area. Second, to evaluate the validity of the survey instrument (questionnaire), that is, to know if the answers provided by the respondents were valid measures of what I was trying to measure, I analyzed patterns of association of the answers. The evidence of how good was the measurement of satisfaction was indirect because I was measuring a subjective phenomenon. Since subjective states of people are not directly observable, I could only infer that what I was measuring should behave in a predictable way (see Fowler Jr., 1995). To evaluate this pattern of association I relied on predictive, construct and face validity.

Predictive validity is the extent to which a measure predicts the answers to different questions. Construct validity means that if several questions are measuring the same or closely related things, then they should be highly correlated with one another. Predictive and construct validity are closely linked because one can expect that if questions measuring similar things are highly correlated, the answer of one question would be a good predictor of the answer to a correlated question. The questionnaire I used in this study was built to measure construct and predictive validity. For instance, after asking for the satisfaction about the overall administration of the cooperative, the members were asked for their satisfaction about different administrative activities, such as the relationship established with authorities and buyers, the ability of managers to get financial and technical assistance, and the way operational rules were applied, among other situations.

Next, some of these situations were 'broken down' to more detailed situations, such as access of members to financial aid, equipment and facilities and technical assistance. In this way, I could expect that members satisfied with the general administration of the cooperative would be similarly satisfied with specific administrative activities and with different situations related to these activities. The final measure of satisfaction was the average satisfaction of all those situations.

The last way to measure patterns of association was face validity, which occurs when the questions measure what the questionnaire purports to measure. Face validity was carried out during the field pretest of the questionnaire. In this situation, people who were tested with the questionnaire were able to express directly if the questions measured what they were intended to measure. Field pretest also helped to improve the wording of the questions and their format.

II.6 DATA ANALYSIS
II.6.1 Qualitative analysis
The qualitative analysis of the data was based on its reduction and interpretation (see Creswell, 1994), which was performed to create categories within which to accommodate the organizational structures, market position and adaptive ability of cooperatives as explained by the directors interviewed. By reduction and interpretation I mean that I reduced a large amount of information to a few categories based on the patterns of appearance of certain organizational and market characteristics, and adaptive responses to extra-organizational changes. I then analyzed and interpreted those categories to help answer the research questions.

The methodology for category construction in the case of organizational and market issues, and for the ability to adapt, involved five basic steps: (1) grouping answers, (2) writing notes, (3) grouping for conditions, (4) creating categories, and (5) creating classes. In the first step, I
quickly read the transcripts from the interviews, to gather first impressions from the data, and make major groups of answers. Groups were created after constantly comparing answers from different respondents to specific questions. Once I had these groups of answers, I wrote several notes with two purposes. The first one was to associate thoughts as I read the interviews again or while working on any other task of my study. Whenever a thought came to my mind related to the groups of answers, I wrote as much information as I could relate to groups of answers even though some of it seemed unimportant.

The second purpose of writing the notes was to initiate the generation of conditions emerging from the data, i.e. to track data from the immediate answers of the respondents, the notes and the resulting conditions. Conditions are the situations required improving the performance of the cooperatives. The conditions were grouped into general categories. To facilitate the positioning of cooperatives in each category, I developed sets of sub-categories. Having developed the categories, I read the transcripts of the interviews once more and compared them with the conditions created to place the cooperatives with the same conditions into different classes. These classes represent similar types of conditions that groups of cooperatives have created to reach their objectives hence determining their performance.

II.6.2 Statistical analysis
The analysis of the data was carried out at two levels. The first was a descriptive analysis of all independent and dependent variables. Descriptive statistics were used to organize the data to present them in an orderly way. The report of this analysis is shown in the Results sections of Chapters III, IV, and V. The descriptive analysis includes my design of an arbitrary counting system to estimate the number of rules from the interview with the boards of directors. Each rule was assigned with a numeric value according to two criteria. The first criterion depends on the action implied by the rule; for instance, if a position rule implies the implementation of four committees, one point is assigned per committee implemented. The second criterion depends on the rule's relative importance for the achievement of the organizational objectives. For instance, in the case of eligibility rules, giving a member the opportunity to defend himself supported by witnesses, was considered a more "structured" rule (value=3) than without witnesses (value=2) or excluding any defense opportunity for the member (value=1). Finally, the values were simply added up to have a total score per cooperative. The counting system showing the score per rule is displayed in Appendix C.

The next level of analysis was performed using the Statistical Package for Social Sciences (SPSS) software (Norusis 1997). At this level of analysis, the strength and direction of the relationship between variables was determined for testing research hypotheses and answering research questions. This level included the application of inferential statistics to make generalized conclusions by inferring characteristics of the population from the numeric description of the sample. Inferential statistics were in turn divided in two major categories. On the one hand, bivariate statistics refer to the determination of the relationship between two variables where neither is an experimental independent variable. The way in which relationships among variables were analyzed was by looking at their association, that is, if one variable increases (or decreases) as the other one increases. As one of the major purposes of the analysis was to assess individually the association among independent variables and the dependent variables, the Spearman's coefficient of correlation was chosen to measure that association.
Although neither correlation nor regression analysis facilitates the definition of the independent variable as predictor of the dependent variable, it is important to stress that while the data show correlational relationship (as shown in latter chapters) they can not be taken as definitive evidence of a causal relationship. There may be more factors that determine whether the dependent variable will change according to one or more independent variables. It may also be true that the variable selected as dependent influences the variables selected as independent. The point is that defining the independent and dependent variables depends upon the research’s objectives and should not be interpreted to mean that the independent variable invariably causes the dependent variable in the real world. To prove causality it is necessary to prove that the relationship is non-spurious, the predictor preceded the effect in time, and there is a plausible rationale for why one variable should be a cause of another.

Multiple correlation analysis, cluster analysis, multiple regression analysis, and multidimensional scaling were applied on Chapter VI to find out the relationship of all variables influencing performance. The analysis then concentrated on the performance of cooperatives during the last year, 1997, of the period analyzed, because it was the only year for which more detailed information on the performance was available. The purpose was to find if there is a differential influence of the variables analyzed between cooperatives practicing small and large-scale fishing.

I used multivariate analysis because I needed to analyze several related variables simultaneously and, without a priori assessment, I considered each variable equally important at the beginning of the analysis. Multivariate statistical methods allowed me to study the joint relationships of variables that are positively correlated. The use of multivariate statistical analysis in this study is an illustrative example of how variables can be analyzed. I had small sample size because I was working with organizations as the unit of observation, and it was impossible to obtain a larger sample size. Recognizing these limitations, the estimates derived through the multidimensional scaling and cluster analysis are the best estimates available of the parameters, given the information available. The findings should be considered only illustrative given the small sample size.

Regarding the sample size for multiple regression analysis, an important consideration is to have more cases than variables. In stepwise regression, a suggested minimum case-to-variable ratio required is to have at least 4 to 5 times more cases than independent variables (Tabachnick and Fidell, 1996). According to this criterion, 15 cases should be adequate as I analyzed 3 independent variables. However, I had 21 cases (cooperatives) making the ratio of 7 cases per each independent variable.
CHAPTER III

RULES, ORGANIZATIONAL STRUCTURES AND PERFORMANCE

III.1 INTRODUCTION

Information collection for resource management, particularly in fisheries, is often focused on the resources themselves rather than on the resource users and their organizations. When information regarding resource users is available, it is often statistical, focused on their numbers, production units, and quantity of outputs. In the same fashion, economic information for resource management often addresses prices per unit produced, production costs, benefits from exports, net incomes, and so on. Only recently have more qualitative factors, such as values, perceptions, group affiliation, and other socio-cultural users' traits been seen as important when developing resource management policies. (Specific references regarding this topic appeared in the special issue of Aquatic Living Resources, Vol. 8, No. 3, 1995.) To be successful, resource management regulations must reflect and be supported by the cultural context within which the management regime operates (Buck, 1989). Broad resource management regimes should also reflect an understanding of local rules in order to avoid disrupting social relationships.

Yet, combining more formal resource management with local rules will not necessarily ensure social cohesion in resource exploitation. As Gross and Rayner (1985) indicate, the number of rules in a management context does not necessarily indicate the strength or wisdom of prescriptions. Groups may use multiple and contradictory rules that ultimately undermine social order and optimal production. Only when rules enhance authority is the advancement of social goals more likely to occur. Similarly, organizational goals are most often achieved when clear rules, and an orderly structure, yield the desired level of performance.

On the other hand, organizational structure and performance have been shown to be associated with different organizational characteristics, such as communication (Fisher, 1974), organizational values (Van Wart, 1998), members' roles (Ross and Ross, 1989), and decision-making behavior (Cyert and March, 1988). Other researchers have studied the relationship between rules and organizational structure, and how changes in one variable affect the other. Those studies indicate that when rules have been largely institutionalized, the structure tends to become rigid, allowing only a small margin for adjustment and adaptation. Rigidity is often a precursor to organizational decline, especially when the environment changes constantly and exposes new challenges to which the organization can not respond adequately in time or mode. On the other hand, when rules and the organizational structure are flexible, adaptation is easier and the changing environment can be confronted more effectively (Cameron, 1984). Flexibility is especially valuable for new, innovative organizations that need to adjust frequently. However, too much ability to "bend and twist" may create a sluggish organization where processes and goals are not completely achieved.

Organizational structures are thus the vehicle by which rules are embodied and implemented. Rules vary across organizations in many dimensions: the severity of sanctions for violating rules, the consistency of enforcement, the degree in which members internalize rules, the way they are carried across generations, and the amount of compliance they receive. Organizations need to develop rules and fit them to an appropriate structure if they are to survive and advance in their specific environmental surroundings.
III.1.1 Purpose of the chapter
The purpose of this chapter is to explore and understand the organizational factors that have contributed to differences in the performance of fishing cooperatives in Yucatan, Mexico. Based on my six-year working experience in the research area, I concentrated on the operational rules that members have implemented to govern their personal associations inside the cooperatives. Also, I was interested in how such rules have determined the organizational structure of the cooperatives and how rules and structure have influenced their performance. This study develops several organizational categories to illustrate how the number and type of rules determine the control within the cooperative, and what organizational elements have been implemented along the levels of decision inside the cooperative's structure.

III.1.2 Research question
In the first Chapter, I established that the two main questions of the study were (1) what are the major sources of differential performance of cooperatives, and (2) how do those sources affect such performance. The sources I analyze in this chapter are operational rules; specifically I explore how they determine the control over interpersonal relationships and influence the emergence and continuance of different levels of organizational structure.

III.1.3 Hypothesis
The operational hypothesis tested to explore specifically the underlying relationship between operational rules and performance (hypothesis one, page 3) is the following:

The larger the number and variety of operational rules followed by a cooperative, the more satisfied its members and the more catch reported.

III.1.4 Definition of terms
III.1.4.1. Rules
In the study of organizations, a rule is a regulatory mechanism of social control by which behavior is shaped into predictable, orderly relationships. In this regulatory connotation, rules are the basis for order within human groups, the mechanism by which behavior becomes dependable by group standards, the procedure by which the internal conflicts are regulated, and the instrument by which collective efforts are mobilized to goal attainments (Neal, 1971). Effective rules, either in a small group or in a whole civilization, are patterns of social relationships that are mutually influencing. Thus, through rules, the interdependency of members upon each other is emphasized, and collective goals are more likely to be attained.

Yet, the mere existence of rules does not assure their compliance. Between rules and observed behaviors lie the mental calculations of individuals who make choices. Some strategies for making choices may result in reciprocity between individuals, whereas some others may lead to 'free-rider' behavior, that is, when some individuals capitalize the benefits of collective action without contributing to the collective effort (Oakerson, 1992). Therefore, central to both types of strategies is the capacity of the organizations to enforce the rules (Fortes, 1983). Enforcement and, by corollary, the breaking of rules, is associated with a system of inducements and punishments intended to make people comply with regulations. In this study the concept of 'rule' will be used concerning its regulatory connotation: a rule is a shared understanding of how people should behave and what should be done if someone behaves in a way that conflicts with that shared understanding (Edgerton, 1985).

Rules are important because they reflect the character of a group. Then, by identifying certain rules, it is possible to anticipate partially the likelihood of a particular behavior in the group (Buck, 1989). Perhaps the most important characteristic for group survival and improved performance is the extent
to which rules are known, recognized, accepted and uniformly internalized by all members of the organization. Also important is the strength of those rules to adaptation to changing extra-organizational conditions. Similarly, recognition and acceptance of rules requires a high degree of correspondence between personal motives and group goals. Thus, the success of social organizations depends upon the extent to which they maximize the fit between personal goals and collective objectives through internal rules, to regulate the interrelationships of members, and suitable structures to reach the objectives (Neal, 1971).

III.1.4.2 Organisational structure

Broadly defined, an organizational structure is a social arrangement in which the activities of a group of people are systematically planned by others in order to achieve some goal. From this definition, it is apparent that functional division operates within an organization. A central authority coordinates the implementation of plans and rules, and the administration of the material and financial capital. The plan is a set of operations organized to achieve the organizational goals, and the capital is the equipment, buildings, experience, funds, and any other factor that can be used for the operation of the organization (Stinchcombe, 1967).

Thus, an appropriate organizational structure is required for the collective action of numerous individuals under similar working conditions. Flows of information, group-decision processes, coordination, and enforcement call for a particular structure (Zusman, 1994). Without some group coordination or organization, no benefits can be obtained from the collective action (Olson, 1971). An organizational consequence of the need of efficient information, coordination, and enforcement is some form of hierarchy (Williamson, 1975). Likewise, Ross and Ross (1989) assert that these hierarchies are necessary to develop rules, roles and leadership according to the people involved, their collective goals, and the changing external circumstances.

III.1.5 Organization of the chapter

The next sections describe three different frameworks important for this chapter. The conceptual framework, using a graphical device, identifies the variables and shows their relationships. The theoretical framework explains the main theoretical approaches used to analyze the relationship between the variables. The context for analysis describes the typical organizational structure of cooperatives and the legal rules designed for their operation in Mexico. Next, the methodology section describes briefly the process of collecting and analyzing the information, emphasizing the procedure used to estimate the number and strength of rules and creating the categories of organizational structures in which the cooperatives were classified. The subsequent section then presents the results of the qualitative and statistical analysis applied to answer the research question and the relationships found between rules and different cooperatives' organizational structures. This section also describes the individual group, and organizational decision-making situations faced at three levels of decision within the cooperatives. The chapter concludes with a discussion on the results obtained, focusing on the influence of official and traditional rules and corresponding formal and informal organizational structures, on the decision-making processes and, ultimately, on the performance of the cooperatives.

III.2 CONCEPTUAL FRAMEWORK

Figure II.1 depicts the conceptual framework employed in this study regarding the relationship between operational rules and performance. For analytical purposes and based on my empirical knowledge in the study area, I assume that operational rules influence the organizational structure, which is an intervening variable that also affects the performance of cooperatives.
The independent variable for this study comprises a set of six operational rules along with a set of ecologically related rules. The former set facilitates collective action and interpersonal relations, and is adapted from Buck (1989), who uses them to describe social relationships in situations where common property resources are at stake. Operational rules comprise the following kinds of rules:

* Eligibility, which refers to the conditions to be member of a cooperative
* Decision, which refers to the approaches and rules used for decision-making in collective actions
* Position, which refers to the conditions that must be satisfied to hold a position in the various committees
* Payoff, which refers to the rewards or penalties assigned to actions or outcomes
* Authority, which refers to the authorized actions members can take independently, and
* Information, which refers to the nature and quality of information that members should share.

The set of ecologically related rules explores the cooperative's attitude towards the biophysical environment and fishing resources. The dependent variable is measured as the members' level of satisfaction and the average total catch per cooperative from 1993 to 1997.

III.3 THEORETICAL FRAMEWORK

The analysis approach adopted here assumes that rules and types of organizational structure are intertwined: rules facilitate the rise of specific structures, and these structures in turn determine the design and modification of rules or the emergence of new ones. Because of this intertwined nature, rules and structures are analyzed from the perspective of structural-functional organization theories that are concerned with the relationships among positions of authority, groups of positions, and work processes. In these theories, the organization is the analytical unit and the central concerns are the structure and effectiveness (Hage, 1980). A structure-functional perspective focuses on the achievement of established objectives through systems of defined rules and formal authorities (Shafritz and Ott, 1992). In answering the basic question underlying this perspective (what forms of organization are the most effective and what are the key structural variables influencing performance), I emphasize general variables that transcend cultural settings and time. Thus, structure itself and rules are used to explain organizational goals. The biggest weakness of structural functionalism, however, is its general lack of attention to anything outside the organization (Hage, 1980), concentrating hence on the centralization of power. In my study, I interpret centralization of power to be the basis for defining the decision-making unit.

The analysis in this chapter also recognizes that organizations include formal and informal rules. The informal rules complement the formal organization by establishing traditional norms of operation
within the cooperative. Therefore, it is necessary to have an understanding of the parallel formal and informal elements of the organizational structure (Blau and Scott, 1962).

This analysis of the organizational structures of cooperatives also assumes the presence of three levels of task performance and decision-making: top or strategic, middle or administrative, and bottom or operational. Theorists recognize these levels in any complex organization; for example, Kleindorfer et al. (1993), describe strategic, tactical and routine decision levels. Similarly, Mintzberg (1979) recognizes a strategic apex, a middle line including supportive administrative staff, and an operating core as components of the flow of formal authority in his five interdependent part organizational model.

At the top level of coordination and decision, the managers are charged with the overall responsibility of the organization. They have to ensure that the organization serves its mission in an effective way and fulfill the needs of the whole membership. The formulation of strategic decisions at this level involves the interpretation of the environment and the design of consistent patterns of organizational behavior to deal with the environment. These strategies affect the well being and nature of the organization. Although leaders make strategic decisions, decisions can also be highly influenced by people at the other levels of decision-making.

People at the middle level of formal authority coordinate mechanisms of direct supervision. These persons pass information on the performance of the lower to the top level, and help the latter to carry out supervisory activities over the lower level. Middle managers also intervene in the flow of resources that must be allocated among organizational areas. They also elaborate plans and operational rules. Kleindorfer et al. (1993) mention that decisions made at this level are tactical. They may contain strategic element, but largely such decisions do not impact the structure or alter the development of the organization. However, the cumulative impact of tactical decisions may be as great as that from strategic decisions.

Finally, the lower level of organizations comprises those members who perform the basic work related directly to the production and distribution of products and services. The operational or technical core is the heart of every organization; it produces the essential outputs that keep it alive. Therefore, it is what the organization seeks to protect through the standardization of activities. Standardization means that activities are repetitive, local in scope, minor in consequence, and guided by operational rules.

III.4 CONTEXT FOR ANALYSIS

The legal boundaries within which the cooperatives operate in Mexico are set out in the General Law of Cooperative Organizations (1994). The law specifies, among others things, the basic organizational components in a cooperative, the positions and responsibilities held by members, the range of activities in which cooperatives can participate, and the lines of communication to connect cooperatives to umbrella organizations and the government. This law describes briefly in three sections the basic structure of the operational rules described earlier. The three sections are about the cooperative's regulatory chart, the responsibilities of the general assembly, and the duties and rights of members. However, the description of the rules is so vague that each cooperative may interpret these rules according to their own interests and experience, and complement them with traditional rules that do not contradict the official regulations. Some of the most significant rules are those concerning eligibility (in three articles), which outline the conditions for excluding members and how they can apply for reconsideration. The only decision rule that appears in one article is the majority rule to make decisions during the general assembly. General discussion of payoff, information, and position rules appear in two articles, and of authority rules in one article. No other type of rule is specified in this law.
In this section, I also illustrate the basic structure of a cooperative as defined by the law above mentioned. Figure II.2 shows graphically the levels at which decisions are undertaken within a cooperative, as well as their corresponding structural units. The bottom level has no structural units and comprises all the members not holding a position.

At the top level, the general assembly (GA), which is the gathering of all of the members, is recognized as the supreme authority. The GA analyzes the performance of the cooperative during the most recent year, and discusses the goals and strategies for the upcoming year. Agreements undertaken in the general assembly apply to all members. The GA attempts to solve all-important problems and may use traditional rules to shape the development of the cooperative. These traditional rules have to agree with the official rules defined in the cooperatives' charter.

In the same top level, the board of directors (BD) is the executive body of the GA and will represent the cooperatives in the presence of authorities, suppliers and buyers. Since the BD is a standing committee, it often has to make short-term strategic decisions whenever there is a problem but it is impossible to gather the GA. Members of the BD can be in their position for five years and be reelected only once for the same period. Decisions at the top level include selecting the appropriate kind of financial sources, defining strategies to control or have access over the harvesting, processing and trading, selecting the kind of markets to deal with, and determining the model of cooperative's growth (specialization or diversification). Another important committee at this level is the surveillance committee.
committee, whose duties are to supervise all levels of the cooperative. The committee is in charge of ensuring that all actions undertaken by any member comply with the regulations of the cooperative.

One or more committees and the hired administrative staff represent the middle organizational level. Each committee is formed by three members and can be in charge of technical control, cooperative education, social prevention (to prevent and attend health problems), and arbitration. Staff may include hired secretaries, bookkeepers, and administrators. Administrative decisions include where to purchase spare parts, how to allocate incomes to pay services, where and when to contact potential buyers, how to manage the bank accounts, and how to allocate economic benefits among the members according to their daily catches. Administrative decisions are related to situations that are repeated routinely every day. Finally, all members that are not holding a position at the top or middle levels represent the bottom organizational level where only technical operations are carried out on a daily basis. These include securing the supply of raw material for production, transforming the raw material into products, distributing the production to the buyers, and providing direct support (e.g., maintenance of equipment) to the previous activities. There are no working units and all members have equal responsibilities and rights.

III.5 METHODOLOGY

III.5.1 Data collection
Information regarding the independent variables, operational rules, was collected through a series of face-to-face, semi-structured interviews with members of boards of directors of 21 cooperatives. Questions focused on the kinds of rules these cooperatives use to regulate the personal interaction of members and to improve the compliance of these rules. I was also interested in learning what kinds of organizational structures were designed to make the rules operational. Scores of rules were estimated as described in Chapter II for each cooperative. The dependent variables regarding performance were measured in terms of the stated satisfaction of members as well as the total average catch per cooperative. I designed a questionnaire to measure the level of members’ satisfaction, as described in Chapter II. The level of satisfaction was measured as the average of overall satisfaction of members within a cooperative regarding all aspects of cooperative administration, using Likert-like scales ranging from 1 = very satisfied to 5 = very dissatisfied. The design of the questionnaire and interviews was informed by Fowler Jr. (1995), and Czaja and Blair (1996).

Information about the fish production per cooperative was obtained directly from the offices that the Secretariat of Fisheries have in the seven communities where the cooperatives are located. Catch records contained information on the amount of Kg per species, per month for each cooperative, from 1993 to 1997. I calculated an average annual catch per species for each cooperative to identify production strategies (diversification vs. specialization). Adding the catch per species, I also estimated an average annual total catch per member as a measure of effectiveness.

III.5.2 Qualitative data analysis
The qualitative analysis of the data is based on its reduction and interpretation. By reduction and interpretation, I mean that I reduced a large amount of information to few categories based on the patterns of appearance of certain rules and organizational characteristics. I then analyzed and interpreted those categories to help answer the research questions.

The methodology for reducing and interpreting the information involved five basic steps: (1) grouping similar or related answers into categories, (2) writing notes, (3) grouping on the basis for external and internal conditions, (4) creating categories, and (5) creating classes of organizational structure. In the first step, I quickly read the transcripts from the interviews to gather first impressions from the data,
and make major groups of answers. Groups were created after constantly comparing answers from different respondents to specific questions. Once I had these groups of answers, I wrote several notes to associate thoughts as I read the interviews again, and to initiate the identification and grouping of conditions emerging from the data, tracking them from the immediate answers from the respondents, to my notes and to these conditions. Conditions are the situations required for improving the performance of the cooperatives, and were grouped into general categories. To facilitate the positioning of cooperatives in each category, I developed sets of sub-categories. Once I had the categories, I read the transcripts of the interviews again, and compared them with the conditions created to accommodate the cooperatives presenting the same conditions in different classes. These classes represent groups of cooperatives that have created similar conditions to reach their objectives.

III.5.3 Statistical data analysis
Spearman's coefficient of correlation analysis was applied to determine if there is a relationship between operational rules and performance, that is, if the second one increases as the first one does. Regression analysis was not attempted since the relationship between independent and dependent variables is not linear and no other relation was robust enough to allow this analysis.

III.6 RESULTS

III.6.1 Data collection
As shown in Table II.2, Chapter II, five cooperatives in two communities, were not willing to participate in the survey to measure the level of satisfaction, therefore the questionnaires were applied to 155 members of sixteen cooperatives, instead of the target sample of 164 members. As these cooperatives represent two different kinds of organizational structure, results on satisfaction should be considered with caution. The total average catch per cooperative during 1993 to 1997 shows dissimilar levels of production, ranging from less than twenty tons per year from barely operating cooperatives, to more than four hundred and fifty tons from the most productive ones. Catches are arranged and shown in the statistical analysis subsection.

III.6.2 Qualitative analysis

III.6.2.1 Creation of conditions and categories
The main category created regarding organizational issues was organizational control (see Table III.2). This category involves the control of cooperative tasks through well-defined lines of authority expressed by the presence of different working units with specific responsibilities (Sub-category: structural units). Organizational control involves in turn the assemblage of different levels of decision-making depending on the type of decision situation faced (Sub-category: level of decision-making), and a corresponding unit of strategic decision-making (Sub-category: unit of strategic decision-making).

The 'structural units' sub-category is defined by several conditions that show the kinds of administrative units that have been established by cooperatives to delegate authority and responsibilities for the achievement of collective objectives. The kinds of units included having no units at all, setting up the board of directors and several committees, devising an administrative unit and hiring secretaries and bookkeepers, and implementing processing, packing, and trading areas. Finally, categories were created to group cooperatives into those without any structural units, those that have some of these units, and those that present almost all of the units.

The 'levels of decision' category involves a bottom level represented by members making only operational decisions concerning daily fishing activities, a middle level that involves several committees,
secretaries, and bookkeepers that make mainly administrative decisions, and a top level that is concerned with strategic decisions to solve very important problems that may affect the development and even the survival of the cooperative. The top level focused on the next sub-category, the unit of control, the one that makes the strategic decisions. Possible conditions ranged from no one making such decisions, or these being made by the board of directors, the general assembly, or by an autocratic or supervisory leader.

Table III.2 shows the classes of cooperatives according to the conditions they have implemented to improve their effectiveness. Classes are described in detail in the following subsection. To make a rough estimation of how well, or bad, cooperatives are doing, they were compared with an ideal democratic cooperative (IDC), which hypothetically should have the following conditions:

1. Setting up of the board of directors and four committees
2. Setting up of an administrative unit, hiring secretaries and professional bookkeepers
3. Setting up of a processing, packing, and trading unit
4. Making operational, administrative, and strategic decisions at the corresponding bottom, middle and top levels
5. Having democratic control

III.6.2.2. Organizational structures

I defined three classes of organizational structure based on the qualitative analysis of information provided by the interviewees. I called these three classes permissive, democratic and authoritative (Table III.2). The three classes defined here, which follow the approach of Ross and Ross (1989), are parallel to the institutional arrangements explored by Orbell and Wilson II (1978) in their study of institutional solutions for N-prisoners' dilemma. These arrangements are uncoordinated individualism, majoritarian democracy, and selfish dictatorship. Each class in my study contains two different structure types described on a control continuum. At one extreme, laissez-aller (unrestricted freedom) cooperatives exert practically no control on their members. On the other extreme, autocratic leaders exert total control over the other members of their cooperatives.

The following description of the structures explains the different levels of decision-making and the organizational units present in each type of structure. The description also identifies the unit of control, and relies on the average score of rules per type of structure to emphasize what rules are the most significant for each type (see Table II.3). Finally, it shows the relationship between the number and type of organizational elements and score of rules. It is appropriate to recall that the hypothesis is that the cooperatives with higher scores of rules have more structural units, make decisions at the three different levels, have a more democratic control, and therefore are more likely to be more successful.
Table III.2
Conditions, sub-categories and categories of organizational structure, and the classes of cooperatives having similar conditions. Totals are the scores that define each class of cooperative

<table>
<thead>
<tr>
<th>Category: Organizational control</th>
<th>Class: Permissive</th>
<th>Class: Democratic</th>
<th>Class: Authoritative</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Laissez-</td>
<td>Non-</td>
<td>Consultative</td>
<td>Participatory</td>
</tr>
<tr>
<td>Sub-category: structural units</td>
<td>aller</td>
<td>directive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>board of directors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>committee of vigilance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>committee of social prevention</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>committee of technical control</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>committee of education</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>administrative staff: secretaries</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>administrative staff: bookkeepers</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>processing, packing, and trading</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Sub-category: level of decision-making</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bottom or operational</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>middle or administrative</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>top or strategic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-category: unit of strategic decision-making</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>none</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>autocratic leader</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>board of directors</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>general assembly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>supervisory leader</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3+</td>
<td>4+</td>
<td>7+</td>
<td>9+</td>
</tr>
</tbody>
</table>

The sign (+) simply indicates the presence of the condition.
Table III.3
Average scores of operational rules among different organizational structures.

<table>
<thead>
<tr>
<th>Rules</th>
<th>Permissive</th>
<th>Democratic</th>
<th>Authoritative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Laissez-aller (N=3)</td>
<td>Non-directive (N=3)</td>
<td>Consultative (N=4)</td>
</tr>
<tr>
<td>Eligibility</td>
<td>2</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Decision</td>
<td>0</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Position</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Payoff</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Authority</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Information</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Ecological</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>33</td>
<td>41</td>
</tr>
</tbody>
</table>

N= the number of cooperatives in each class

III.6.2.2.1 Permissive cooperatives
In this class, organizational control of members’ actions is minimal. Once this minimum of organizational control is achieved, the cooperative focuses on maintaining the status quo. There is practically no organizational structure.

III.6.2.2.1.1 Laissez-aller cooperatives
Three out of twenty-one cooperatives in the sample are at this level of control. Laissez-aller cooperatives exhibit the weakest type of members' control. That is, they have devised the smallest number of operational rules among cooperatives in Yucatan. The total average score of rules is eleven. Scores for decision and information rules is zero, and for position and authority rules are only two, reflecting the lack of a board of directors, committees, or any other organizational unit. This situation means that expectations and objectives of the members can be satisfied with a low organizational level. These cooperatives avoid defining responsibilities and lines of authority, their members make mostly operational decisions and take adaptive actions to reduce the effects of problems but without correcting them. Their only 'strategic' objective is to get fishing permits for catching lobster, but once the permit is obtained, each member works individually in his own boat, and usually sells his catch to the buyer who finances the fishing permit fee. None of these cooperatives has administrative staff, assets or capital, and they do not hold any formal meetings.

III.6.2.2.1.2 Non-directive cooperatives
Non-directive cooperatives show a higher organizational level since their average score of rules is thirty-three points, nineteen of which are concentrated on eligibility and decision rules. The average scores for position, authority, payoff and information rules are on average two-three points, not too different from scores in laissez-aller cooperatives (see Table III.3). Therefore, these cooperatives are characterized by unclear lines of authority, merely informative general assemblies, low members' participation, and weak patterns of communication in the decision making process. These cooperatives are focused on maintaining the status quo; this type of control is efficient when there is no need for change. Objectives are reduced to provide members with a job opportunity and to accomplish minimum production expectations. There are no goals to increase production or level of organization.
Three cooperatives operate with this organizational structure, in which the board of directors performs the administrative tasks since there is no other supporting committee or staff. Assets include the boats, engines, gears, and basic equipment to keep the catch for one day and to transport it to the buyer processing facilities.

III.6.2.2.2 Democratic cooperatives
In democratic cooperatives, the general assembly is recognized as the supreme authority. Since the assembly is the gathering of all the members, there is a more democratic control over the cooperatives' interests. Therefore, there is an increased level of participation of the members in the development of the cooperative. Members' participation in decision-making is expressed through individual votes.

III.6.2.2.2.1 Consultative cooperatives
In consultative cooperatives, there is a general increment in the different rules average score. The total average score is forty-one points, fourteen of which are for decision rules. Despite the recognition of the general assembly as the supreme authority, the board of directors is the effective unit of control over the decisions that affect the whole organization. The board of directors is very influential as it receives information directly from the extra-organizational environment when representing the cooperative with the authorities and dealing with buyers and suppliers. This information is then used to influence the opinion and position of other members regarding specific decisions.

Although patterns of participation are higher than in previous levels because members share the cooperatives' problems and provide ideas and suggestions, the final decisions made by the BD may not reflect the membership's inputs. This situation corresponds to the consultative level of citizen participation described by Arnstein (1969) in which participants are asked for their opinion regarding a specific issue but which is finally solved without considering such opinion. The board tends to be ready to make changes when they are required, but without previous commitment to change. Four cooperatives exhibit a consultative level of control with a number of committees to back up the board of directors. These cooperatives have hired secretaries and bookkeepers to perform the administrative duties. The value of assets owned by consultative cooperatives is higher since gear, truck and catch-icing equipment are newer and bigger; each cooperative owns its own building to hold meetings, and to accommodate administrative offices and storage rooms.

III.6.2.2.2.2 Participatory cooperatives
In participatory cooperatives, the participation of members in the management of the cooperatives is at its maximum expression. Correspondingly, decision and eligibility rules scored eighteen and fifteen, respectively, are the highest scores among the cooperatives sampled. In general, members are more willing to plan alternatives to achieve their objectives. Setting forward production goals and planning members' development in advance are important elements for the progress of these cooperatives. Besides regular meetings to monitor the directors' performance and to discuss any kind of problem affecting the organization, positions rules allow the set up of committees to delegate responsibilities among members, which then have more participation in the control of the cooperative. Specialized staff carries out the administrative duties, always under the supervision of the committees' members. Three cooperatives are at this organizational level, which has made it easier for them to own more varied and valuable assets. For instance, one group has processing, packing, and freezing facilities, which allows it to sell directly to the national and international markets. Another cooperative manages its own gas station to supply about one thousand fishermen in three fishing communities.

III.6.2.2.3 Authoritative cooperatives
In this class, the cooperatives' control depends almost entirely on one leader whose opinion is accepted by his authority inside the group. The structure of the cooperatives reflects the structure of the
corporate sector, since these groups are located in the most developed fishing community that has a business-oriented atmosphere. Cooperatives try to copy the administrative structure of the fishing firms located in the community, although some of them are inactive because the leaders exerted exclusive control over the organization, using it entirely to satisfy their personal interests.

III.6.2.2.3.1 Supervisory cooperatives

The organizational structure of supervisory cooperatives is reduced to one leader, one general administrator, and administrative staff. Hence, position rules' scores represent only 8% of the total score. Due to the small size of these groups (less than 20 members), no other committee is set up. The leader, holding the president position in the board of directors over a course of five to ten years, exerts general supervision on all the fishing processes; from preparing the vessels for catching to processing and trading of the catches. Decision rules comprise 26% of the total score. Because of this concentration of power, information, and responsibility, these groups are thought of as the most efficient cooperatives because of their firm-like structure. The leaders tend to plan their actions ahead of time in order to achieve the cooperatives' objectives. Administrative staff usually includes one or two secretaries and a bookkeeper supervised all the time by the leader or the administrator. Despite the fact that the leaders define production goals and strategies, they consider members' information and input to assess or to generate alternative options. This feature increases the legitimacy of decisions among the members. Three cooperatives are identified as supervisory, two of them own large-scale vessels, vehicles, offices, and processing facilities; thus are technically and financially independent.

III.6.2.2.3.2 Autocratic cooperatives

In autocratic cooperatives, the tightest control is exerted over the members. However, rules scores are the second lowest, fourteen on average, because rules are highly personalized, thus constrained to satisfy the leaders' interests. In these groups, the leader exercises a strict, close supervision of the members and their tasks. The concentration of authority and decision-making is the highest among all types of cooperatives. The leaders make decisions without consulting or informing the members. There is no delegation of authority; therefore, the leader's personal interests override cooperatives' interests. Administrative staff is reduced to a single secretary. Assets included mainly large-scale ships that were acquired through bank credits, but had been lost because the financial administration directed the investments to satisfy the leaders' welfare. These cooperatives had no processing facilities, making them entirely dependent on the buyers to process and trade the catches. All of the five autocratic cooperatives reported very low catches during the five-year period of catches analyzed.

III.6.3 Statistical analysis

Table III.4 shows the results of the average overall satisfaction, the average catch and the score of rules per cooperative. A not-so-clear association was found between the scores of rules and performance. For example, some cooperatives with scores of rules ranging from 42 to 53 reported less satisfied members (average satisfaction = 2-3) than other cooperatives with lower scores of rules ranging from 28 to 40 (average satisfaction = 1.7-1.9). Similarly, despite a tendency of higher average catches matched with higher rule scores, there are some inconsistencies with this relationship. For instance, less structured cooperatives (CP, EC, and RL) recorded higher catches (343, 217, 337 tons respectively) than those having a more structured organization and higher scores of rules (TPM with 179 tons, PS with 133 tons, and CA with 17 tons). In the next section I discuss the causes of these discrepancies. All other cooperatives have lower rules' scores and reported their members as dissatisfied (4) and very dissatisfied (5).
Table III.4
Summary of overall satisfaction, average catch (tons), and total score of operational rules of fishing cooperatives in Yucatan

<table>
<thead>
<tr>
<th>Cooperatives Id</th>
<th>Organizational structure</th>
<th>Average Satisfaction</th>
<th>Average Catch (tons)</th>
<th>Total of rules score</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLP</td>
<td>Participatory</td>
<td>n.a.</td>
<td>433</td>
<td>64</td>
</tr>
<tr>
<td>SF</td>
<td>Participatory</td>
<td>2.9</td>
<td>484</td>
<td>53</td>
</tr>
<tr>
<td>DB</td>
<td>Participatory</td>
<td>2.0</td>
<td>318</td>
<td>52</td>
</tr>
<tr>
<td>TPM</td>
<td>Supervisory</td>
<td>n.a.</td>
<td>179</td>
<td>48</td>
</tr>
<tr>
<td>PS</td>
<td>Supervisory</td>
<td>n.a.</td>
<td>133</td>
<td>47</td>
</tr>
<tr>
<td>CA</td>
<td>Supervisory</td>
<td>1.2</td>
<td>17</td>
<td>43</td>
</tr>
<tr>
<td>PG</td>
<td>Consultative</td>
<td>2.7</td>
<td>100</td>
<td>43</td>
</tr>
<tr>
<td>CP</td>
<td>Consultative</td>
<td>3.0</td>
<td>343</td>
<td>42</td>
</tr>
<tr>
<td>EC</td>
<td>Consultative</td>
<td>1.7</td>
<td>217</td>
<td>40</td>
</tr>
<tr>
<td>RL</td>
<td>Consultative</td>
<td>1.7</td>
<td>337</td>
<td>40</td>
</tr>
<tr>
<td>CCB</td>
<td>Non-directive</td>
<td>n.a.</td>
<td>69</td>
<td>36</td>
</tr>
<tr>
<td>PD</td>
<td>Non-directive</td>
<td>n.a.</td>
<td>37</td>
<td>35</td>
</tr>
<tr>
<td>CPP</td>
<td>Non-directive</td>
<td>1.9</td>
<td>68</td>
<td>28</td>
</tr>
<tr>
<td>PI</td>
<td>Autocratic</td>
<td>5.0</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>DP</td>
<td>Autocratic</td>
<td>5.0</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>PII</td>
<td>Autocratic</td>
<td>5.0</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>PC</td>
<td>Laissez-aller</td>
<td>5.0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>PCH</td>
<td>Autocratic</td>
<td>4.0</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>NK</td>
<td>Autocratic</td>
<td>5.0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>E</td>
<td>Laissez-aller</td>
<td>4.0</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>B</td>
<td>Laissez-aller</td>
<td>5.0</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

I estimated total catch per cooperative and catch per member as direct measure of performance. However, all performance measures have some inherent biases and limitations. Total catch seems like a good measure but it ignores the different sizes of membership of cooperatives. Catch per member seems reasonable, but it has disadvantages too. Using total catch, a ranking of the cooperatives, from the most productive to the least productive, gives the following order: participatory, supervisory, consultative, non-directive, autocratic, and laissez-aller. On the contrary, when using catch per member, the order is different: supervisory, non-directive, participatory, consultative, autocratic and laissez-aller. That is, in comparison with the total catch per cooperative as indicator, catch per member switched the position of non-directive cooperatives to be more successful than democratic cooperatives.

To make productive each fishing trip, a crew of at least two fishers, or even three when catching octopus, need to be present to operate the boats. I didn’t use the catch per member as an indicator of cooperatives’ performance because in non-directive cooperatives the number of members and boats is almost the same, indicating that there is only one member per boat. Therefore, non-members are required to operate the boats. This situation overestimates the catch per member in non-directive cooperatives.

Regarding the organizational structure, the cooperatives with the lowest number of rules have the lowest control and hence the weakest organizational structure (none or few committees and administrative staff), whereas the cooperatives with higher structured organization (several committees and administrative staff) have higher rules' scores. On one extreme, the three participatory
organizations (RP, SF, and DB) accounted for higher scores of rules, reflecting their democratic nature. All types of rule are invoked during the general assemblies and during the daily tasks to coordinate the operations of committees, members and staff. On the other extreme, all non-directive, laissez-aller, and autocratic cooperatives have no administrative units and staff, hence their structure needs fewer rules to maintain and operate. Supervisory and consultative cooperatives are in an intermediate position, although the former shows a higher score of rules. The difference is that supervisory cooperatives have implemented more structured rules to interact with intermediaries.

The Spearman correlation coefficients estimated from the total score of rules as independent variable and the satisfaction and average catch as dependent variables are $R_o=0.68$ for satisfaction and $R_o=0.86$ for average catch. Because of these coefficient values, it is possible to say, according to the sample analyzed, that there is a positive relationship between performance and operational rules. Put in other words, it is possible to assert that there is a tendency for the cooperatives with higher score of rules to have more satisfied members and to report higher levels of production.

III.6.4 Operational rules in action: a democratic decision-making

I describe the way decisions should be made in a democratic cooperative organization to make the application of operational rules more understandable. There are at least four decision-making situations that cooperatives in Yucatan have to deal with depending on the type of organizational structure. The situations can be:

1. **organizational strategic** when important decisions are made during the general assembly, as in participatory cooperatives;
2. **individual strategic** when relevant decisions are made by individuals, as in supervisory cooperatives;
3. **group administrative** when the board of directors make mostly administrative decisions, as in non-directive and consultative cooperatives, and
4. **individual operational** when members make only individual decisions related to their fishing activity, as in laissez-allure and autocratic cooperatives.

Therefore, the general assembly, the leaders, and the board of directors can be considered as the units of control in different cooperatives. The cooperatives making organizational and individual strategic decisions also make administrative and operational decisions at the corresponding middle and bottom levels. The cooperatives making group administrative decisions also make operational decisions at the bottom level. The cooperatives making individual operational decisions make no other kind of decision. I describe only organizational strategic decisions to illustrate the implementation of operational rules. The other three types of decision-making are described in detail in Appendix E.

III.6.4.1 Strategic organizational decision-making

A descriptive model of organizational decision-making explains how cooperatives make strategic decisions concerned with the achievement of collective goals. The model assumes that the general assembly is recognized as the major authority. The model was developed based on the descriptions made by the interviewees and on the Ross and Ross (1989) and Fisher (1974) models. Figure II.3 depicts the three phases of the decision-making process. In the first phase, before the general assembly, a problem is identified mainly concerning the failure of achieving a specific collective goal. Information rules define the authorized channels of communication between members of the cooperative holding different positions. Information rules also specify the way information has to be transmitted (language and form) from those concerned with the identified problem to the board of directors, and from this to the rest of the members.
Next, using authority rules, the board of directors has to set an agenda to discuss the problem, propose alternative solutions to it, and determine what structural units are going to implement the solution adopted. The same board carries out the procedure to call for the meeting, defining the date and time.

In the second phase, during the assembly, there are in turn three stages to reach a consensus and actually make a decision. The stages are information, discussion, and emergence of a decision. In the information stage, the members take a tentative position because they might have a partial information or understanding of the decision situation. Therefore, this stage serves to ask for and receive information, which has to be, under information rules, clear and reliable. Information should provide the members with directions and ideas to support or reject alternative solutions to the problem.

In the discussion stage, at least three coalitions emerge: those who support and those who oppose the decision proposals, and a non-participatory coalition. Therefore, negative-positive interactions are always present in the development of any cooperative. The non-participatory coalition does not actively engage in the discussion between the other two coalitions, typically playing a spectator role. However, this coalition can be greatly important when it comprises most of the members: if they have to take a position and vote, they will determine the final decision. Therefore, the 'pro' and 'con' coalitions have to be talented in formulating convincing arguments if they want to succeed in the decision process.

Still at the discussion stage, a consensus may arise regarding the setting of the solution. Members may realize that the solution can be found internally and that the cooperative has the means and resources to implement a specific solution. On the contrary, members may find out that the solution is external to the cooperative, and they have to deal with the environment to reduce or eliminate the problem. It may happen as well that the solution has a combination of both internal and external conditions in which case mixed actions and means have to be implemented. Scope rules play an important role at this stage because these specify the set of means and actions, and their costs, the cooperative considers as acceptable.

If the solution is internal, the problem may be divided into sub-problems and either assigning them to working units for specific solutions, or attending the sub-problems at different times. The first option is known as local rationality, whereas the second option as sequential attention (Cyert and March, 1963, in Chen, 1984). In either case, distributional or temporal paths allow for the efficient use of the means and resources that the cooperative has readily available to solve its problems. On the other hand, if the solution is external, the first action is to search for information to find the means, resources, and aid necessary to solve the problem. Authority rules are used at this point to decide the structural units (committee, administrative staff) that should take actions.

Depending on the severity of the problem, the information search can be made simpler by seeking assistance from known sources at the local level. Complex information search involves looking for new sources of assistance at the regional or national levels. Once identified, cooperatives have to negotiate with the sources of assistance, which include political, legal, scientific, social and economic agents. The experience of the members influences the success of the searching and negotiation (Chen, 1984).

The third stage in the second phase, during the assembly, is the decision emergence, when the coalitions have expressed both 'pro' and 'con' arguments and the cooperative moves close to consensus because members are changing their opinion or because they temporarily accept the other coalition's opinion. Members make their position public regarding the decision situation at the end of this stage in the voting process. Unanimity is not necessary to make a cooperative decision since the majority rule, a decision rule, has been agreed in most cases. The majority rule gives the consensual character of
decision-making in cooperatives. Once a decision has been made, the agreement is valid to all members, even those in opposition and the absent ones. The final phase in the decision-making process, after the general assembly, implies the implementation of the appropriate action to overcome the problem, according to the agreement reached. If the solution proposed implies costs and benefits for the members, payoff rules will help to define how these costs and benefits are to be distributed among members. In this phase, there is a prescriptive component of the decision-making process regarding organizational learning. If the problem is solved, the cooperative should reinforce or increase its knowledge about the definition and evaluation of problems, and the implementation of appropriate solution actions. The knowledge gained should then be applied to achieving other collective goals. If the problem is not solved, a new meeting is called upon to reevaluate the problem and identify better solutions. This feedback mechanism may help to neutralize extra-organizational disturbances and the associated risk and uncertainty. In Chapter IV, I discuss in more detail how cooperatives incorporate new knowledge to increase their ability to adapt to new extra-organizational circumstances and how it influences their performance.

III.7 DISCUSSION

Action within and performed by cooperative organizations is collective action. Collective action implies an interdependent aggregation of individual choices aimed to reach a common goal. Of course, individuals may have different and often contradictory interests. In order to regulate the personal interaction of self-oriented individuals and lead them towards the achievement of common goals, coordination mechanisms and rules have to be devised and implemented. Mechanisms and rules should focus on individual decision as well as on group structure and interaction. Other researchers have reviewed many formal theories and models of collective action (Oliver, 1993). One model that seems relevant to this study is based on the general issue of 'second order' problems of collective action, such as the generation of sanctioning and rule-creating systems. Heckathorn (1988, in Oliver, 1993) models sanctioning systems in which an external control agent imposes collective actions on a group: if any member of the group defects, the whole group is punished. The model shows that external sanctions can drive members either way, to enforce compliance or use their local sanctions to resist the external control agent. By considering the central government as the external agent of control, formal rules as the external sanctions, and locally developed sanctions as informal rules, it can be shown that fishing cooperatives in Yucatan had imposed internal rules to force cooperation and reduce defection. I elaborate more on formal and informal rules below.

III.7.1 The nature of operational rules

In this chapter, I am interested in a set of operational rules used by more than one person to regulate decision-making and interpersonal relationships during interdependent collective actions. The character of the set of rules is defined as prescriptive and configurational. It is prescriptive because it refers to actions that are prohibited, permitted or required. In this way, rules structure particular situations. Since rules are variables that can be changed and are used to structure situations, it is then possible to modify these situations by changing the rules. Theoretically, operational rules may be modified in order to change the structure and internal personal interrelationships of any organization (see Ostrom, 1986).

The set of operational rules I analyzed in this chapter is configurational because they jointly affect the structure of situations. Configuration means that the operation of one rule depends
upon the operation of the other rules in the set. Thus, authority rules that define delegation of
authority from the board of directors to the administrative level to the operational level should
be complemented with position rules to define what structural units should hold authority on a
particular matter. Complex organizations, because of their size (democratic cooperatives) or
their diversification (supervisory cooperatives), have set up more committees with authority to
coordinate more complicated relationships among an increased number of members with a
more diversified range of activities. Similarly, payoff and eligibility rules may act together as a
barrier or an incentive for potential members. Harder eligibility criteria, small rewards and
tougher penalties (as in democratic cooperatives) may prevent fishermen from joining a
cooperative. Flexible eligibility criteria, large rewards and few or no penalties (as in laissez-aller
cooperatives) may in turn induce fishermen to participate in a cooperative.

The methodological consequence of the configurational character of the operational rules is
that a researcher needs to specify a set of rules, instead of a single rule, as the unit of analysis.
Operational rules are norms that can not be studied separately. Instead, when changing a rule,
theoretically and practically, it is necessary to consider carefully which other rules may be
affected or should be modified and how the outcome relationships or situations may change.
Thus, when the question is how to change an organizational structure (as a particular situation)
it is necessary to know which set of operational rules determine, among other factors, that
structure (see Ostrom, 1986).

**III.7.2 Rules, structures and performance**

The partially non-conforming results shown in Table III.4 between rule scores and
performance can be explained in at least two ways. The first is that satisfaction of members and
collective goals may be achieved with a few operational rules and a lower organizational
structure. For instance, members of non-directive cooperatives have reached individual goals
with fewer, simpler rules, and have matched them with cooperative's goals. Routine activities
of members are focused on production and consequently, decision-making rules are not
directed to best outcomes, but to satisfactory ones. The administration of these cooperatives is
conducted in fact by the intermediary, whose administrative structure and capabilities are more
developed. Transferring their administration to intermediaries provides less structured
cooperatives a two-fold benefit. First, there is no need to set up committees or hire external
staff; and second, being in charge of the processing and commercialization of the catches the
buyer absorbs uncertainty from the market. Both situations allow the cooperatives to
concentrate on production and to protect the operative tasks from disturbances. Consequently,
however, the connections between organizational levels are weak, developing a loosely coupled
system (Weick, 1966, in Hougland and Shepard, 1980), whose main, if not the only, objective is
to maintain a specific level of production.

The second factor that may explain why more structured organizations are apparently less
efficient is cooperatives' readiness to change. For instance, the three supervisory cooperatives
started their adaptation to a firm-like organizational structure in the early 1990s. In fact, one of
them re-structured its organization in 1996. Re-structuring was necessary since these
cooperatives were performing poorly; it is since their re-structuring that catches have been
steadily increasing. On the contrary, the previous non-directive cooperatives have maintained
their structure since their inception in the early 1980s, which has allowed them to dominate
their technical operations and keep constant catch records.
On the other hand, organization size has a positive effect on administrative intensity because the organization's structure becomes more elaborate, producing coordination problems for which the organization compensates by hiring additional administrative staff. Administrative intensity is defined as the relative size of administrative personnel in the organization (Freeman and Hannan, 1975). The participatory and consultative cooperatives are the biggest ones (100 - 200 members), thus having the necessity to create a higher number of committees and hire professional and nonprofessional supportive staff at the middle level in order to maintain their more complex democratic structure.

Depending on the relative number and complexity of operational rules, cooperatives depend, to a varying degree, on their own resources or external forces to shape their development. Internal and external dependency influences, in turn, the performance of these groups. The market dependency of consultative, non-directive, autocratic, and laissez-aller cooperatives is inversely proportional to the respective total rules' scores: the lower their scores, the higher their dependency. Autocratic and laissez-aller cooperatives depend totally on different buyers, transferring to them all strategic and administrative decisions. Consultative and non-directive cooperatives deal with the same buyer, but the reliance on more operational rules makes consultative cooperatives more independent than non-directive ones.

On the other hand, participatory cooperatives have established exchange relations with one or two buyers, but the higher number of operational rules devised allow them to increase their influence on, and minimize the influence from the market. Therefore, the wider the range of rules, decisions, and options available, the more independent a cooperative is from external regulations. On the contrary, the more dependent it is on outsiders, the less autonomy on decision-making and rule devising. In summary, there is a general tendency of Yucatan cooperatives to be less effective as their autonomy decreases.

III.7.3 Informal and formal operational rules of cooperatives

As a formal organization, the cooperatives are shaped by formal rules that are designed by the central government and are stated in the cooperatives' chart. Therefore, it is expected that all cooperatives will comply with these rules. At the same time, there is a set of customary, informal rules characteristic to each group that make them different in one way or another. Thus, the particular combination of these two sets of rules determine the structure of the cooperatives in the way of setting positions to be held by members, defining the conditions to enter to and exit from the group, and determining lines of authority, information patterns, and payoff arrangements. The control that results from a combination of rules and organizational structure gives each cooperative its distinct capabilities to achieve its particular goals.

Rules in general are important because the interdependence of members upon one another is complex. If collective goals have to be attained, effective control within voluntary associations needs to design patterns of social relationships that are supportive and mutually reinforcing. Control is achieved through rules that have to be well understood by participants to be used in any situation (Ostrom, 1986). Further, rules can be viewed as relations structuring these situations. In this situational analysis, rules are not seen as directly affecting the participants' behavior. Rather, members use rules to determine a set of actions or outcomes from participating in a group. Individuals rarely expect only one outcome from being a member of an organization (Ostrom, 1986).
Two general types of rules have governed personal interrelationships within cooperative organizations. One type includes informal or traditional rules, which have behind them the authority of the society that have created them, increasing the compliance of individuals on what is sanctioned. Informal rules are designed in a common language that is understandable to any individual. This fact facilitates individuals' participation in the enforcement of the rules. Dissemination is usually done through cultural practices, such as storytelling, performances, dances, and patterns of behavior defined locally. Informal rules pervade even social organizations' boundaries because the practical performance of organizations is determined by the social context within which they operate (Putnam, 1992).

The other general type of rules comprises formal rules, which are designed by experts that use a more technical language and have control or direct access to social structures with enforcement capabilities. Due to the written nature of formal rules, only literate people have direct access to them, but because they are fraught with technicalities, their correct interpretation is restricted to other specialists. The dissemination of formal rules is transferred to a legal structure or a central administration. Formal rules are often equated to laws dictated and enforced only by central governments, embedded in highly complex legal frameworks, and being increasingly ambiguous. These characteristics make formal rules hard to understand and adopt by individuals that have followed traditional rules for generations.

It is hard to say which type of rule has been more important for the development of the cooperative sector in Yucatan fisheries. What seems reasonable to accept, according to the interviews, is that the relative compliance of cooperatives’ members is positively related to the strength of external, formal rules and the level of control exerted by other members.

Another external control agent that also imposes rules on the behavior of cooperatives is the market. Its influence has contributed to render interesting patterns of distribution of organizational structures along the coastal communities in Yucatan. Spagnolo (1999) points out that cooperation becomes harder in communities after they get in touch with developed markets. However, the personal (or impersonal) relationship established directly between the community and its organizations, and the market agents (intermediaries) has to do also with the continuance or breakdown in cooperation. For example, the five democratic cooperatives distributed in the four easternmost communities have higher levels of cooperation and compliance with official and market rules because members have traditionally based their personal interactions on strong social, production and resource control rules (Murphy and Solis, 1983).

On the contrary, laissez-aller cooperatives in the westernmost community had responded to external control agents in an entirely different manner. Access to developed markets has brought an increase in freedom to engage in market exchange relations on an individual basis and this has eroded cooperation. Each cooperative member has become free to interrupt his relation with the cooperative, to obtain credit from the intermediaries instead of continuing to cooperate in the credit relations of the cooperative, and to seek particular buyers instead of selling his catches to the cooperative. Loyalty to cooperative organizations has been drastically undermined. Market regulations have reduced the strength of traditional rules and punishments, guaranteeing intermediaries a higher level of production. Informal rules have been overcome by exchange transactions, reducing cooperation and collective action to the
point that traditional social and resource control relationships are not sustainable in the long-term.

The basic process through which community informal rules are transmitted into voluntary organizations, such as cooperatives, is by imitating the success of other community members (see Zucker, 1987). Imitating the social reality of the community within the organizations' structure is important because it increases the flow of societal resources and enhances long-term social stability within the organization. On the other hand, the process by which formal rules are transmitted to voluntary organizations is through a normative transference of legal rules. When legal rules exert large pressure on the social organizations, these usually protect their operational activities by isolating them from the rest of the organizational structure, reducing its efficiency by focusing on production (Meyer and Rowan, 1977).

For instance, as changes in the legal framework for exploiting fishing resources introduced the responsibility of fishermen to manage and plan their production, most cooperatives focused only on production and transferred management and planning to the intermediaries. Finally, rules also arise within the organizations. Some internal regulations are readily "institutionalized", that is, codified into operational rules and maintained without further justification and elaboration, and are highly resistant to change (Zucker, 1987). Thus, understanding particular combinations of formal and informal rules is important to understand the structure and performance of cooperatives.
CHAPTER IV

ADAPTATION ABILITY AND PERFORMANCE

IV.1 INTRODUCTION

Adaptation to change is a fundamental process by which entities thrive over time. Within biology, adaptation refers to both physiological and evolutionary processes. Physiological adaptation is an organismic response to variations in environmental parameters in order to maintain homeostasis. Evolutionary adaptation in turn refers to genetically based changes across generations that may result in more efficient use of specific environments (Alland, 1975). Anthropologists have adopted these definitions to provide analogies of human individual processes in cultural studies. Adaptation has also provided a framework based on evolution and natural selection that incorporates the heterogeneity of individual and collective human behavior (Barlett, 1980). In organization theory, population ecology approaches focus on competition, selection, and survival of the fittest in populations of organizations. These approaches resemble Darwinian theory of evolution in that survival of an organization depends on its ability to acquire adequate supplies of critical resources (Shafritz and Ott, 1992).

The term adaptation does not imply that there is a best, unique optimum response to a specific environmental situation. On the contrary, it conveys the idea that adaptation has enough positive features to re-establish equilibrium with the environment, but at the same time it also has negative features. Just as biological evolution is constrained by the inherited structure of populations, human groups and individuals are affected by inherited cultural structures (Barlett, 1980). In fact, some authors have distinguished between individual and organizational adaptive strategies (Whitten and Whitten, 1972). The difference is that individual strategies are short-range choices to adjust to their environment, whereas long-range changes made by organizations are adaptive processes that involve structural reorganization. Adjustment strategies and adaptation processes are responses to different kinds of crises between the individual or organization and the environment (Hage, 1980).

Before responding to environmental changes, organizations must seek information helpful in clarifying the choice of response. The gap between the information the organization possesses and what is needed as a result of a new relationship with the environment, generates levels of uncertainty that limit the ability of the organization to plan and to make decisions (Galbraith, 1973). One of the main objectives of any organization is to close this gap and reduce uncertainty. Changes in the environment may be produced by different elements, which may be divided into two major categories, the technical-natural environment, and the social, political and economic environment (Barlett, 1980). Adaptation has been analyzed at the individual level (Payne et al. 1990; Dalsgaard, 1996), as well as at the collective level, such as in higher education schools (Peck, 1984; Cameron 1984), firms (Cyert and Kumar, 1996), and other organizations (Whetten, 1987; Cyert and March, 1988). Studies of fast adaptation responses have been supported by the military (Payne et al., 1993).

A few studies have tried to understand the influence of a set of adaptive responses on cooperatives’ performance when adjusting to environmental disturbances. McCay (1980) and Orbach (1980) have characterized cooperatives as an adaptive mechanism for improvement of members’ economic performance, especially when they depend financially on a monopolistic group of intermediaries. One set of cooperatives’ adaptive approaches, as outlined by McCay (1980), includes investing in facilities, purchasing supplies, and hiring professional managers. Adaptive strategies of cooperatives to adjust to market demand and resource availability include specialization and diversification of production (Vasquez-Leon, 1995). In addition to economic adaptive responses, Petterson (1980) analyzes the political and social adaptation of fishing cooperatives on the pacific coast of Mexico. Adaptive psycho-
cultural characteristics, such as independence, have also been identified as mechanisms to help fishermen to cope with environmental uncertainty (Poggie, 1980).

IV.1.1 Purpose of the chapter
The purpose of this study is to investigate how organizational factors influence the performance of fishing cooperatives in Yucatan, Mexico. Based on my empirical experience and my review of relevant organizational literature, I concentrate in this chapter on the adaptive ability of cooperatives to respond to changes in the extra-organizational environment as a means of re-establishing its equilibrium with the external environment. I also analyze how these responses are determined by different organizational structures, and what aids and strategies cooperatives use for adaptation. To achieve this analysis, I have developed a framework with several levels of organizational adaptive ability to classify cooperatives according to their ability to adapt.

IV.1.2 Research question
I established two main research questions in the first chapter. These were (1) what are the major factors influencing differences in performance of cooperatives, and (2) how those factors affect cooperative performance. To answer these questions, it is important to know what kind of dynamic relationships exist between the cooperatives and their social, economic, biophysical, and political surroundings.

IV.1.3 Hypothesis
To guide the answer of the research questions, I formulated the following operational hypothesis:

The higher the adaptive ability of a cooperative, the more satisfied its members and the more catch reported.

IV.1.4 Definition of terms

IV.1.4.1. Organizational adaptation, learning and development
Alland (1975) defines adaptation as the ability of a system to return to the previous state when conditions permit. External changes are usually discontinuous and require some sort of response from the organization. For some responses there is no need to transform the organization from one type to another. These responses are regarded as adjustments. On the contrary, Cameron (1984) argues that for real adaptation it is necessary to modify the organizational design or its components in order to adapt to changes in the external environment. Hage (1980) mentions that transformation occurs only when there is an imbalance between structure and performance. Thus, adjustments and adaptation as transformation of structure will be used in this chapter to analyze the ability of cooperatives to respond to extra-organizational changes and to describe two major adaptation phases in their historical development in Yucatan.

A brief distinction between organizational learning and organizational development is needed to distinguish differential characteristics of organizational adaptation. It will help to understand how these three processes proceed in parallel throughout the 'history' of any organization. An organization follows a development plan to achieve its overall objective of surviving. Organizational development focuses on changes motivated from within the organization and is oriented to assess the impact on individual attitudes and behaviors. It aims at keeping the actual direction and intensity of development as planned (Goodman and Kurke, 1982, in Cameron, 1984).

On the other hand, the main aspiration of organizational learning is to improve the performance of the organization, either from planned activities or from adaptation. Organizational learning is oriented to shape targets, such as success, which is measured by the difference between pre-established outcomes
and the aspiration of the organization to those outcomes. Organizational learning is a process at the individual and organizational levels since both learn, have a collective memory and experience, and design mechanisms to disseminate that experience and learning (Levitt and March, 1988). Cooperatives also have to learn to assess their own performance and to draw lessons from attempts to adjust to environmental disturbances.

**IV.1.4.2. Environment**

There are at least two general conceptions of the environment in the organization theory literature. In one representation, the environment is the flow of information perceived by members at the cooperative's boundaries. An essential concept in this representation is uncertainty since the complexity and instability of the environment flavors the information flowing into the cooperative with uncertainty. The information search and analysis of this environment performed by the organization can generate uncertainty as well. In the second version the resources available represent the environment, paying less attention to the process by which members capture information. When the environment is considered as a stock of resources, an important concept is dependence on external agents for resources (Aldrich and Pfeffer, 1976).

It is intuitively appealing to expect that resources may vary from one community to another, and different structures and information systems may lead decision-makers to perceive reality differently. Thus, the environment in which organizations operate can be considered in both ways: as a stock of resources available and by the way organization's managers perceive reality. However, in my study I considered the environment only as a supply of resources (legal, financial, biological, market, and technological) that the cooperatives have to appropriate in different ways according to changes in this supply. Trying to understand the way managers perceive reality would have led the study to a microanalysis perspective. However, I mentioned in the first chapter that this perspective was not considered because it would have involved psychological and individual behavioral analyses. Both analyses are beyond the scope of this study.

**IV.1.5 Organization of the chapter**

The remainder of the chapter includes three different frameworks to conclude the introduction. The conceptual framework identifies the variables under analysis, that is, the adaptive ability of cooperatives and their performance, and explains how these variables are interrelated. For the explanation, the framework uses a graphic representation of the interdependent variables. Then, the theoretical framework explains the different theoretical perspectives to analyze organizational adaptation. It will explain two approaches to analyze the relationship organization-environment: when organizations make choices and design strategies to respond to environmental changes, and when the environment selects the fittest organizations and leads the weak ones to extinction. The operational framework will describe the relevant characteristics within which cooperatives operate in Yucatan; the description will help the reader to understand the environmental disturbances and the appropriateness of the cooperatives' responses. In the methodology section I briefly describe how the information was collected, arranged and analyzed. The next section shows the qualitative and statistical results. The final section is the discussion that focuses on the phases of adaptation at the cooperative's population level, the cooperatives' strategies and aids for adaptation, and the factors constraining the adaptation of cooperatives.

**IV.2 CONCEPTUAL FRAMEWORK**

Figure IV.1 depicts the conceptual model adopted in this paper to characterize the relationship between adaptive ability, organizational learning and development, organizational structure, and performance. The variables' terminology described by Davis (1985), identifies variables prior to the
independent variables, and intervening variables between independent and dependent variables. Environmental disturbances are prior variables because they precede the independent variable in time, and because they define the adaptive ability of cooperatives. Two intervening variables, the organizational structure and the organizational development influence the adaptive ability. It means that cooperatives may respond differently to the same stimuli depending on their own structure, developmental plan, methods and resources available to achieve that plan. Adaptive responses are actions and strategies that lead to either the achievement of objectives or its failure. The level of performance is ultimately the dependent variable under study. Whatever the performance is, cooperatives should be able to learn and apply this knowledge when adjusting to new extra-organizational changes; therefore, organizational learning may be referred to as a consequent or parallel variable.

![Conceptual model for adaptation](image)

**Figure IV.1. Conceptual model for adaptation**

The independent variable, adaptive response to environmental disturbances, was classified according to the different adaptation strategies developed by cooperatives. Adaptive responses vary according to the type of disturbance, the organizational structure, and the type of decision-making unit. The ability of the cooperative to respond to external changes implies knowing how the cooperative adapts to new circumstances, and how this ability has led to different performances. Adaptation requires a certain degree of flexibility in the rules, internal control for organizational development, and organizational learning capability. No less important, availability of financial and material resources is necessary to implement adaptive actions. The dependent variable is measured in two ways: the first one is as the stated members' level of satisfaction with the general cooperative management, and the second one is the average total catch per cooperative during 1993 – 1997.

**IV.3 THEORETICAL FRAMEWORK**

There are at least two approaches by which organization theory tries to explain the interaction between organizations and environment. The analytical device to view these approaches is an “influence continuum” in which one end represents the power that organizational decision-making units have to adapt to ensure survival and improve performance. At the other end, decision-making units have no
power to adapt; therefore, the continuance of these organizations depends on the environment and its changing nature (Cameron, 1984).

**IV.3.1 Approaches assuming substantial influence from the decision-making units for adaptation**

In these approaches, organizations are assumed to have the power to act and influence their environment. Although these models recognize the importance of extra-organizational influence and the need for organization-environment equilibrium, the existence of a number of strategies available to decision-making units to modify the environment and determine the success or failure of adaptation is assumed (Cameron, 1984).

The literature on organizational adaptation based on decision-makers’ actions is divided in two major perspectives. In the cybernetic-adaptive perspective, organizations are open, social systems with always changing processes of interactions among organizational and environmental elements (Katz and Kahn 1966). Organizations are adaptive systems that are integral parts of the environment; they must adjust to changes in their environment if they are to survive. Wiener, (1948) developed a classic model of an organization as an adaptive system by applying the concept of cybernetics to mean multiple structures and functions of control and information processes. The main concept of cybernetics applied to adaptive organizations is self-regulation through biological, social, or technological systems that can identify problems, do something about them, and receive feedback to adjust themselves automatically (Shafritz and Ott 1992). This perspective merges, among others, a systems approach, strategic choice and organizational behavior. In strategic choice, organizations select alternative pathways to move from one state to another (Child 1972). In the organizational behavior, an organization is adaptive because it modifies its behavior according to its experience. But it is also incompletely rational because it acts upon imperfect and incomplete information about alternatives and their consequences. Finally, the organization is a political coalition because it consists of individuals and groups with different values and often-contradictory demands (Cyert and March, 1988). In these approaches, the environment is perceived as a stock of resources available for the organization.

The other perspective of organizational adaptation is labeled “symbolic action”. It focuses on the change of symbols, interpretations and stories as opposed to changes in the organizational structure and technology to appropriate resources. Here, the environment is perceived as a flow of information apprehended by members at the boundaries of the organization. According to this conception, organization members share common interpretations of reality, common symbols and stories, creating a particular cultural making of reality. Thus, adaptation comes when members change their language, rituals, and symbolic behavior. This type of adaptation model, however, will not be discussed further because the original design of the thesis did not consider this level of the social psychology of cooperatives. However, it is considered as an interesting approach for future research.

**IV.3.2 Approaches assuming little or no influence from the decision-making unit for adaptation**

These approaches are taken from the population ecology theory, which assumes that natural selection processes operate among organizations. These do not adapt to their changing environment by making decisions; instead, the environment selects among organizational forms. Population ecology theory is based in the ecological concept of niche, or the specific place in the environment filled by a particular organization. The niche is the sub-unit of the environment that supports the organization. The amount of market, financial, legislative, technological and biological resources available to the organization determine its size. Its shape is defined by the organizational activities performed by the cooperative to appropriate those resources (see Aldrich and Pfeffer, 1976; Hannan and Freeman,
Both, resource availability and the way of appropriation determine the position and influence that a cooperative has with respect to other organizations within its “population”.

This ecology-sociologic analogy predicts that generalist organizations —the ones performing a wider range of activities— have more adaptation capabilities when the shape of the niche is transformed. On the contrary, specialist organizations —those that focus to a narrow range of activities— adapt better when the size of the niche is altered. In other words, diversification is the strategy for successful adaptation when there is a change in the way organizations appropriate resources, whereas specialization is the successful adaptive strategy when there is change in the availability of resources (Cameron, 1984). A final comment on population ecology is that adaptation is meaningful only at the population level of analysis, and that there is a selection process of the fittest organizations driven by their environment.

IV.4 CONTEXT FOR ANALYSIS

Some of the most important elements of the external environment in which fishing cooperatives operate in Yucatan are the legislative framework, the market and financial settings, the technological level of fishing, and the availability of resources. All of them are briefly introduced to provide a context for analyzing the adaptive responses to disturbances in the external environment. It is important to note that these disturbances do not necessarily appear isolated and spontaneously. They may occur because of intertwined factors. Hence, the adaptive responses may be progressive and have multiple unintended effects. Therefore, the following uni-dimensional disruption-response treatment is only a simplification for clarity.

IV.4.1 Legal framework

The Fisheries Law of Mexico has endured many modifications since it was first decreed in 1924. However, the most important changes occurred in 1992, when a series of modifications altered its basic nature (Legal Framework for Fisheries, 1992). Before 1992, all the Fisheries Law versions reflected the 27th Constitutional article, which established that all natural resources are originally State-owned, and are given to individuals for a socially-orientated exploitation. Under this condition, fishing policies were oriented to elaborate regulations to ensure the rational exploitation, preservation and social orientation (giving priority to food production) in the appropriation of marine resources (Fisheries Law, Articles 1 and 2, 1986). The Secretariat of Fisheries was vested with the obligation of setting the scientific and technical basis to elaborate legal regulations. The central legal instrument to access the fisheries was the fishing permit, which was non-transferable and was valid for two years. Similarly, a non-transferable concession was also available. Eight of the most valuable species were given for exclusive exploitation to fishing cooperatives (Fisheries Law, 1986).

The situation changed drastically when the most recent Fisheries Law was decreed in June 1992. Two fundamental statements were erased from the previous version: ‘the State has original property rights’ and ‘this Law is of public domain and social interest’. The juridical consequences are that the Secretariat of Fisheries obligation of regulating the exploitation of marine resources is narrowed to the vague, ambiguous statement of “establishing the allowable catch levels”. The pivotal legal tool for accessing fisheries is now a transferable concession that can last from five to twenty years, or even fifty years in the case of aquacultural practices (Chapter II, Articles 4, 6, and 8, Fisheries Law, 1992) (Villamar, 1994). It seems reasonable to view this extension as giving legal assurance to potential private investors, since the “exclusivity” condition for valuable resources was abrogated in the new law, as it stated in its Article 7, Chapter II:
"The Secretariat of Fisheries could subject the granting of licenses and or permits to a process of competitive bidding for the utilization of an area, species or groups of species for commercial fishing."

Other usual fishery regulations include closed seasons for lobster (March-June) and octopus (January-August), plus minimum legal sizes, protection of egg-carrying females and use of legal fishing gear for all species. In summary, legal changes made the concession the central mechanism to exploit species and fishing areas, opened the possibility to private investors to get a concession since it can be transferred as a commodity and, consequently, increased the competition and pressure from the market toward the cooperative sector.

IV.4.2 Market setting
Before the creation of the first cooperative in Yucatan in the second half of the 1950s, markets for fishing products were developed at the local level, concentrating on sell of fresh and dried products in the coast and the capital city. As production was increased and diversified in the early 1960s, the new market opportunities were developed and expanded. The market response was in turn a growing demand for fresh and processed species, especially lobster, grouper and octopus (see Sanchez, 1995, and Gonzalez et al., 1989). Expanding markets provided opportunities for investments in processing facilities, introduction of technological innovations, and hiring personnel for marketing activities. However, (Medina 1988) argues that fishermen were unprepared to take over this new situation because they had traditionally concentrated on harvesting.

A diverse group of middlemen started buying fishermen's catches and selling them first regionally and then at the national level. The entry of fish buyers redefined the local fishing market. Currently, the market agents are fishermen, "small-scale" fish buyers, and fishing companies. Only 15% of fishermen are associated in cooperatives and other similar associations. Small buyers acquire fish from individual fishermen and sell inexpensive species directly into the local market, whereas the most expensive ones are sold to big companies. These enterprises also buy the catches of cooperatives and other fishermen associations, and possess their own fleets to ensure their fish supply, since they sell directly to the national and international markets (see Figure IV.2).

![Figure IV.2. Commercialization relationships in the fishing market in Yucatan, Mexico](image-url)
Thus, fishermen are entangled in a market structure in which an oligopsonistic group of middlemen has the power to influence the species’ price according to their convenience. Middlemen control the demand, determine the way catches have to be handled onboard, and have access to the national and international markets’ information (see Blomquist et al., 1990). Under this scheme, middlemen practice collusive price fixing to limit competition, and abuse their dominant position by setting low purchase prices and adopting strategic barriers to restrain entry of new or outside fish buyers (see Acocella, 1998). The major market exchanges are original expansion of demand in quantity and diversification in catch composition, the latter concentration of demand on basically three species, and the new relationships established with the fish buyers.

IV.4.3 Financial sources
When cooperatives had to respond to the expanded fish product demand with increased productivity, they had to modernize their equipment. However, government loans were slow because of bureaucratic processes, and expensive in terms of the political compromise. The bank loans were expensive in terms of the interest rates. The last resort was the middlemen, who provided fast credit with ‘no interest’, but under the condition of exclusive right to buy cooperatives’ catches, and to have preference in setting the prices. Under this arrangement, most cooperatives were unable to accumulate enough capital to pay back their debts, then were forced to ask for more financial aid from the same buyers. This relationship has largely determined the market and financial situation of most fishing cooperatives in Yucatan.

The common financial sources that cooperatives should have are sales of catches, financial holdings, and borrowing money, but imbalances among these three sources have led some cooperatives to cases of financial restriction, total financial dependency, and even bankruptcy. Imbalances are described using the financial structure depicted by Dalsgaard (1996). The system is a series of three boxes from which resource users can get money to carry on planned activities. The cash box is for ongoing cash payments, the assets box contains the current holding of financial assets and outstanding accounts used for investment purposes, and the debt box comprises the current cooperative’s debt. Imbalances can appear when any of the boxes is much bigger than the other two. For instance, putting a high percentage of the profits in the assets box may reduce the cash box. When the assets box is big enough to invest in durable possessions, it may cause inflexibility in the purchasing of short-span equipment. In summary, financial disturbances, which are intimately linked to the market, stem from the original financial dependency on government, banks and middlemen and, more recently, only on middlemen.

<p>| Table IV.1 | Principal technical characteristics of the cooperatives’ fleet in Yucatan |</p>
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Small-scale</th>
<th>Middle-scale</th>
<th>Large-scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (m)</td>
<td>7.3</td>
<td>10.1 - 16.7</td>
<td>18.3 – 20.0</td>
</tr>
<tr>
<td>Material</td>
<td>Fiber glass</td>
<td>Fiber glass</td>
<td>Fiber glass, wood</td>
</tr>
<tr>
<td>Gear</td>
<td>Hook and line, “jimba”</td>
<td>Long-line</td>
<td>Long line</td>
</tr>
<tr>
<td>Engines</td>
<td>Outboard</td>
<td>Stationary</td>
<td>Stationary</td>
</tr>
<tr>
<td>Power (H.P.)</td>
<td>45 – 65</td>
<td>85 – 175</td>
<td>225 – 450</td>
</tr>
<tr>
<td>Catch-keeping system</td>
<td>Ice</td>
<td>Ice</td>
<td>Ice – freezing</td>
</tr>
<tr>
<td>Navigation system</td>
<td>Loran in few cases</td>
<td>Loran, radar</td>
<td>Loran, radar</td>
</tr>
</tbody>
</table>
IV.4.4 Technological level
Only four out of the twenty-one cooperatives sampled operate large and middle size long-liners, while
the other seventeen cooperatives operate small-scale boats with multiple-purpose fishing equipment
(i.e. suitable to catch several species). The main fleet technical characteristics are summarized in Table
IV.1.

The level of technological development of cooperatives is influenced by the species behavior, the
physical characteristics of the environment, the availability of financial assets to purchase equipment,
and by the need to adapt to changes in the market preferences. Before the 1960s, fishing methods
were based on the traditional ecological knowledge produced through generations of experience.
Combining traditional knowledge about the target species and imagination, there was not any need for
a sophisticated technology, which was more efficient and would impact the natural processes of the
stock under exploitation. After the market expansion, fiber glass boats, outboard engines and nylon
lines were introduced in all coastal communities, plus the introduction in one community of large
vessels operated with advanced technology for navigation and harvesting. These have been the largest
technological disturbances in fishing, besides a recent attempt made by the Secretariat of Fisheries to
ban a metallic stick that is used to catch lobster.

IV.4.5 Resource availability
The level of resource exploitation varies for each species according to the market demand. In this way,
octopus, lobster, and grouper are the species with higher demand and hence the fisheries with alarming
symptoms of over-exploitation and over-capitalization. Salas and Torres (1997) conducted an analysis
of the level of marine resources use in the Yucatan Peninsula based on the scientific literature. They
concluded that there is no definitive information for assessing the condition of most stocks other than
the three most important species listed above. However, because of increased exploitation, the catch
per unit of effort has been diminishing gradually. According to several studies in the area, the
distribution of different species is assumed to be homogeneous along the region (Yanez-Arancibia,
1994), although catch composition in each community may provide an index of a differential species’
distribution. Changes in the abundance and distribution of different species are considered the major
disruptions to the resource.

IV.5 METHODOLOGY
IV.5.1 Data collection
Information regarding the independent variable, adaptive ability, was collected through a series of face-
to-face, semi-structured interviews with members of cooperatives’ board of directors. Questions
focused the kinds of responses the cooperative usually implements when there are disturbances in the
surrounding environment. I was also interested in knowing what aids and strategies they use to
implement the responses. The dependent variable, performance, was measured as the satisfaction of
members and as total average catch per cooperative. I designed a questionnaire to measure the level of
members’ satisfaction, as described in Chapter II. The design of the questionnaires and interviews
followed approaches outlined in Fowler Jr. (1995), and Czaja and Blair (1996). Information about the
fish production per cooperative was obtained directly from the offices that the Secretariat of Fisheries
has in the seven communities where cooperatives are located. Catch records contained information on
the amount of Kg per species, per month for each cooperative, from 1993 to 1997. I calculated an
average annual catch per species for each cooperative to identify production strategies (diversification
vs. specialization). Adding the catch per species, I also estimated an average annual total catch per
member as efficiency measure.
IV.5.2 Qualitative data analysis

The qualitative analysis of the data regarding independent variables is based on its reduction and interpretation. I reduced a large amount of information to a few categories based on the patterns of appearance of certain adaptive responses to extra-organizational changes. I then analyzed and interpreted those categories to help answer the research questions.

The methodology for reducing and interpreting the information involved five basic steps: (1) grouping answers, (2) writing notes, (3) grouping for conditions, (4) creating categories, and (5) creating levels. In the first step, I quickly read the transcripts from the interviews, gathered first impressions from the data, and attempted some preliminary major groups of answers. Groups were created after constantly comparing answers from different respondents to specific questions. Once I had these groups of answers, I wrote several notes with two purposes. The first one was to associate thoughts as I read the interviews again or while working on any other task of my study. The second purpose of note-writing was to initiate the identification of conditions emerging from the data, tracking them from the immediate answers from the respondents, to my notes and to these conditions.

Conditions are the situations required for improving the adaptive ability of the cooperatives. Similar conditions were grouped into general categories and sub-categories. I then read the transcripts of the interviews again, and compared them with the conditions identified in order to group together those cooperatives having similar conditions and hence having similar levels of adaptation ability. An additional, brief analysis identifying which cooperatives have developed a more autonomous decision-making format to choose their adaptation processes and which ones depend more on the external environment, specifically on the market (intermediaries) component, was also done. This supplementary analysis was done by comparing their degree of autonomy from intermediaries against their adaptive ability.

IV.5.3 Statistical data analysis

Correlation analysis was applied to determine if there is a relationship between adaptive ability and performance, that is, if the second one increases as the first one does. An analysis of the catches per species for each cooperative was performed to illustrate how different strategies have been developed to adapt to the changes in the abundance of resources, that is, in the size of the niche, as mentioned in section IV.3.2.

IV.6 RESULTS

IV.6.1 Data collection

Results on data collection are similar to those shown in Chapter III, that is, information for analyzing the independent variables was obtained from interviews with 21 members of the board of directors of 21 cooperatives. The dependent variable was analyzed with information from the survey on satisfaction, in which 155 members of 16 cooperatives participated. To measure the performance in terms of production, the total average catch per cooperative was calculated from official records including 1993 to 1997.

IV.6.2 Qualitative data analysis

The major category created from the analysis of the interviews is the ability to adapt, and includes several sub-categories according to different elements of the extra-organizational environment. These sub-categories describe what conditions (responses, aids, and strategies) the cooperatives have devised to adapt to changes on these elements (see Table IV.2). In the case of the relationship with the market, the responses for improving the performance are creating conditions such as having freedom to sell the catches, having influence on pricing the catches, searching for market information, and increasing
their bargaining power. In the case of the financial situation sub-category, the response conditions relate to the balance of the cooperative's financial system and its reinvestment policy. When changes are in the legislative arena, conditions created as response in this sub-category are an active or a passive lobbying for those legal changes affecting the cooperative. In the technology sub-category, the only condition found was whether or not the cooperatives improve their catching technology. Regarding marine species, cooperatives may diversify or specialize in the composition of the catch, or they may propose measures to protect these species.

In the aids and strategies sub-category, the types of aid devised to improve adaptation include the creation of scenarios to foresee what alternative settings look like and make decisions based on those scenarios. Another common aid is comparing themselves with other cooperatives' failures and successes to evaluate their performance and identify how others have solved problems. Strategies refer to concrete actions aimed to achieve adaptation. Major strategies are those in which it is necessary to negotiate with the environment, specifically with the market and the legal elements of it, in which case responses are referred as political. The other adaptations are those that are primarily internal, such as diversifying or specializing in the catch composition, and expanding operations. The latter implies either making structural changes or devising parallel processes. In addition, internal adaptations reflect a cooperative's maturation process because routines are institutionalized as they prove to be efficient in achieving adaptation. Routines include rules, procedures, strategies, technologies, beliefs, frameworks, paradigms and knowledge (Levitt and March, 1988).

All cooperatives have to cope with the market element of the environment. In doing so, adaptive strategies of negotiating with the environment are basically dealing with the fish buyers, a relationship that determines to a great extent the financial, technological and biological changes in the extra-organizational surroundings. The other adaptive strategy is the political response to legal changes, which also has influenced, and is influencing, the financial, technological and biological components.

As in the previous chapter, to have an idea of how well cooperatives are performing in response to changes in the extra-organizational environment, they were compared to an ideal democratic cooperative (IDC) having the following conditions. Hypothetically, this ideal cooperative has every condition to adapt effectively to the external environment (considering the conditions of Yucatan fisheries).

1. Having freedom for selling the catches
2. Having influence on pricing the catches
3. Searching for market information
4. Increasing their bargaining power
5. Balancing the cooperative's financial system
6. Reinvesting in fishing equipment and other assets
7. Having an active lobbying for legal changes
8. Improving the catching technology
9. Diversifying or not the composition of the catch
10. Proposing measures for protecting marine species
11. Creating scenarios for solving problems
12. Comparing their performance with other cooperatives
13. Politically negotiating legal changes
14. Institutionalizing the expansion, diversification and specialization of operations
IV.6.3 Levels for adaptive ability

According to table IV.2, cooperatives are grouped into four different levels of adaptation: (1) low adaptation, (2) adaptation for survival, (3) adaptation for improvement, and (4) adaptation for expansion. Rather than displaying a series of sharply differentiated levels, this grouping represents an adaptation gradient where it is possible to identify the relative position of the fishing cooperatives. At the same time, responses may adjust to more than one disruption providing intentional and unintentional results.

IV.6.3.1. Low adaptation

Cooperatives with low adaptation are the ones that depend more heavily on intermediaries. Because these cooperatives seek protection from middlemen to cope with the market uncertainty, they have no bargaining power; thus, they cannot influence the price of their catches. Consequently, their position makes it unnecessary for them to seek market information in order to look for better prices. In any case, they do not have capital or experience to search for information. Lack of capital is explained because the financial system is ill adapted to the market. The cash and assets boxes are so depleted that they lack financial reserves to be able to adjust. Put in other words, the borrowing capacity and the ability to raise money at any rate are exhausted. Consequently, there are no reinvestment plans. When there have been changes in the fishing legislation, these cooperatives adjust passively enough to keep their registration and to be eligible to obtain the fishing permits.
<table>
<thead>
<tr>
<th>Category: Ability to adapt</th>
<th>Low adaptation</th>
<th>Adaptation for survival</th>
<th>Adaptation for improvement</th>
<th>Adaptation for expansion</th>
<th>IDC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sub-category: Market relationship</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freedom to sell</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influence on pricing</td>
<td>+/-</td>
<td>+/-</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market information searching</td>
<td></td>
<td>+/-</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bargaining power</td>
<td>+/-</td>
<td>+/-</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-category: Financial situation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Financial system: balanced</td>
<td></td>
<td></td>
<td></td>
<td>+/-</td>
<td></td>
</tr>
<tr>
<td>Unbalanced</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
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<tr>
<td>Reinvestment</td>
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<tr>
<td><strong>Sub-category: Legislative</strong></td>
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<td></td>
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<tr>
<td>Lobbying: passive</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Sub-category: Technology</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improving catching technology</td>
<td></td>
<td>+/-</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-category: Marine resources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catch composition: diversified</td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Specialized</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Propose/Implement protective measures</strong></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-category: aids and strategies</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aids creating scenarios</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>comparing with others</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td><strong>Strategies</strong> political negotiation</td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>institutionalization of routines for: expansion</td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Diversification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6+</td>
<td>9+</td>
<td>14+</td>
<td>16+</td>
<td>17+</td>
</tr>
</tbody>
</table>
Technologically, they have kept at the small-scale level, which allows them to catch only a reduced number of species distributed close to the coast. Their fishing strategy regarding the resource availability is highly specialized since the catch composition concentrates more than 85% on one species (see cooperatives PC, RC, E, and N in Appendix D). Using the classification for cooperatives developed in Chapter III, laissez-aller and autocratic cooperatives show low adaptation. For these cooperatives, it has brought almost no organizational structure and catching is at the lowest level. Moreover, in the latter cooperatives, adaptations were not as needed, showing that there are "bad" adaptations and that, despite the pervasiveness of their negative consequences, there was no organizational learning to improve adjustment to future disruptions or even to correct the previous wrong one. Most autocratic groups are now out of operation.

IV.6.3.2. Adaptation for survival

The cooperatives categorized as non-directive and consultative adapt just to keep their structure alive. Their responses to financial, legislative, and technological changes are almost the same as the previous cooperatives. Contrary to low adaptive groups, this type of cooperative has a visible structure, and some assets, although reinvestment has concentrated in replacement of fishing equipment.

They also have diversified more in their catch composition, since more than 85% of it is represented by three or four species. Non-directive cooperatives (PD, CPP, and CCB) catch between four and eight different species in lower proportion than 5%, whereas consultative cooperatives (EC, CP, and RL) catch between five and twenty-four other species (see table in Appendix D). Diversification gives the opportunity to cooperatives to expand their production and to negotiate its price with the fish buyers, especially in the case of the expensive ones. For instance, PD, CPP, and CCB cooperatives catch important percentages of yellow tail snapper that is more expensive than the lower priced grouper.

IV.6.3.3. Adaptation for improvement

Groups in the 'adaptation for improvement' category are more competitive than cooperatives in the previous categories since they can influence the prices paid in their communities. Although they sell almost their entire production to one buyer, they can get access to market information and have some power to negotiate prices with the buyer for the most valuable species. However, they have not been able to eliminate their historical financial dependency on middlemen. Their financial system is less unbalanced than in the previous case, which allows for reinvestment in equipment and facilities. Regarding changes in the fishing legislation, these cooperatives actively oppose the regulations when they are unfavorable for them. Interest in technological innovations is expressed by the fact that many boat owners use simple navigation equipment to mark the most productive fishing spots. These groups have diversified their production and have proposed protective measures besides official regulations, such as reducing the entrance of new boats in order to safeguard local resources.

IV.6.3.4. Adaptation for expansion

These cooperatives display full competition because they own processing facilities and have experience in commercializing. Therefore, they have access to market information that is used to negotiate their catch price, mostly with more than one buyer. In doing so, the groups do not depend entirely on one single buyer, in acquiring financial independence. In this way, liquidity allows cooperatives to keep a low debt and increases their readiness to adjust if required. These groups lobby actively when proposed new regulations are likely to reduce the benefits and/or increase the costs of their activity. Since efficiency is one of the goals set by these cooperatives, they are more interested in exploring technological innovations in both harvesting and processing. In an attempt to balance the efficient use
of resources and their conservation, these groups have proposed protective measures. Fishing strategies include diversification and specialization according to collective goals. Table IV.3 summarizes the responses and levels of adaptation.

Table IV.3
Adaptive responses of fishing cooperatives to environmental disturbances

<table>
<thead>
<tr>
<th>Ability to adapt</th>
<th>Market</th>
<th>Financial -</th>
<th>Legislative</th>
<th>Technology</th>
<th>Species availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Low adaptation</td>
<td>Seek protection No influence on price No information searching No bargaining power</td>
<td>Unbalanced financial system No reinvestment</td>
<td>Passive, limited to get permits</td>
<td>Status quo</td>
<td>Specialization</td>
</tr>
<tr>
<td>2 Adaptation for survival</td>
<td>Seek protection Some influence on price No information searching Some bargaining power</td>
<td>Unbalanced financial system No reinvestment</td>
<td>Passive, limited to get permits</td>
<td>Status quo</td>
<td>Diversification</td>
</tr>
<tr>
<td>3 Adaptation for improvement</td>
<td>Seek independence Some influence on price Some information searching Some bargaining power</td>
<td>Unbalanced financial system Reinvestment on equipment and facilities</td>
<td>Active lobbying, opposing—supporting fishing policies</td>
<td>Some interest in changing</td>
<td>Diversification Protective measures</td>
</tr>
<tr>
<td>4 Adaptation for expansion</td>
<td>Full competitiveness Influence on price Control information Bargaining power</td>
<td>Balanced financial system Reinvestment on equipment and facilities</td>
<td>Active lobbying, opposing—supporting fishing policies</td>
<td>More interest in changing</td>
<td>Diversification -specialization Protective measures</td>
</tr>
</tbody>
</table>

IV.6.4 Cooperative influence on the adaptation process and adaptive ability

I graphically associated the level of adaptive ability and the control that cooperatives hold to choose and direct alternative ways to adapt to disturbances in the external environment. I show in Figure IV. 3 the relative position of cooperatives in Yucatan with regard to these two variables. The cooperatives that have more control in deciding what adaptive actions to take are those in which the unit of control, whether an individual or the general assembly, makes strategic decisions enabling the survival and advancement of the cooperative. On the other hand, cooperatives with less control to adapt are those in which the environment ‘determines’ their survival, because their dependency on different components of the environment is higher. In this way, these cooperatives may miss advancement opportunities if they do not take control over plans of action when there is a disruption in their relationship with the environment.

Under this line of analysis, participatory cooperatives and those with autocratic and supervisory leaders have substantial power to make adaptive decisions. However, autocratic cooperatives have lower level of adaptation. These are cooperatives with no organizational resources (structure, rules, and adaptive ability) to respond to changes in the environment, and have a minimal influence over their surroundings. On the other hand, laissez-aller cooperatives are the ones that are completely at the mercy of the environment, because the market component of the environment controls these groups.
This situation has made them to hold the slightest level of adaptation, or it is sufficient only to satisfy their goals, which seems to be just for survival.

Higher level (4) of adaptive ability

- supervisory
- participatory
- consultative

Lower control over the adaptive process

Laissez-
aller

Higher control over the adaptive responses

Autocratic

Lower level (1) of adaptive ability

**Figure IV.3. Relative position of cooperatives regarding their adaptive ability and control over the adaptation process**

### IV.6.5 Statistical data analysis

A positive correlation was found between the adaptive ability of cooperatives and their performance. The Spearman's rho test gave the results shown in Table IV.4. These results indicate strong positive relationship between the variables. Since the correlation coefficient measures the linearity of the relationship, members' satisfaction and average catch will in general, be higher as the adaptive ability of the cooperative increases, which allows me to accept the hypothesis stated in Chapter I.

| Table IV.4
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Non-parametric correlation adaptive power vs. performance</strong></td>
</tr>
<tr>
<td>Adaptive ability</td>
</tr>
<tr>
<td>Significant at level (1-tailed)</td>
</tr>
<tr>
<td>Number of cooperatives</td>
</tr>
</tbody>
</table>

The results also reflect a higher impact of the cooperative adaptation responses on the members' satisfaction than on the average catch. In fact, I found that some cooperatives with the higher level of
ability to adapt (TPM, PS, and CA) reported lower average catches than some with less adaptive ability (CP, RL, and EC) (see Table IV.5).

### Table IV.5
Summary of adaptive ability, satisfaction and average catch (tons) of fishing cooperatives in Yucatan

<table>
<thead>
<tr>
<th>Cooperatives Id</th>
<th>Level of adaptive ability</th>
<th>Average satisfaction</th>
<th>Average catch (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLP</td>
<td>4</td>
<td>N.a.</td>
<td>433</td>
</tr>
<tr>
<td>SF</td>
<td>3</td>
<td>2.9</td>
<td>484</td>
</tr>
<tr>
<td>DB</td>
<td>3</td>
<td>2.0</td>
<td>318</td>
</tr>
<tr>
<td>TPM</td>
<td>4</td>
<td>N.a.</td>
<td>179</td>
</tr>
<tr>
<td>PS</td>
<td>4</td>
<td>N.a.</td>
<td>133</td>
</tr>
<tr>
<td>CA</td>
<td>4</td>
<td>1.2</td>
<td>17</td>
</tr>
<tr>
<td>PG</td>
<td>3</td>
<td>2.7</td>
<td>100</td>
</tr>
<tr>
<td>CP</td>
<td>3</td>
<td>3.0</td>
<td>343</td>
</tr>
<tr>
<td>EC</td>
<td>3</td>
<td>1.7</td>
<td>217</td>
</tr>
<tr>
<td>RL</td>
<td>3</td>
<td>1.7</td>
<td>337</td>
</tr>
<tr>
<td>CCB</td>
<td>2</td>
<td>N.a.</td>
<td>69</td>
</tr>
<tr>
<td>PD</td>
<td>2</td>
<td>N.a.</td>
<td>37</td>
</tr>
<tr>
<td>CPP</td>
<td>2</td>
<td>1.9</td>
<td>68</td>
</tr>
<tr>
<td>PT</td>
<td>1</td>
<td>5.0</td>
<td>5</td>
</tr>
<tr>
<td>KKH</td>
<td>1</td>
<td>5.0</td>
<td>1</td>
</tr>
<tr>
<td>JMC</td>
<td>1</td>
<td>5.0</td>
<td>19</td>
</tr>
<tr>
<td>PC</td>
<td>1</td>
<td>5.0</td>
<td>0</td>
</tr>
<tr>
<td>PCH</td>
<td>1</td>
<td>4.0</td>
<td>1</td>
</tr>
<tr>
<td>NK</td>
<td>1</td>
<td>5.0</td>
<td>0</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
<td>4.0</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>5.0</td>
<td>0</td>
</tr>
</tbody>
</table>

### IV.7 DISCUSSION
The approach of analyzing cooperatives from an organization theory perspective assumes that they are open, dynamic systems that adapt to environmental disturbances both by the availability of strategies to decision-making units and by the environmental influence (Hage 1980). In the first case, greater attention is directed to the internal political decision-making processes and to the idea that organizations seek to manage or strategically adapt to their environment. Regarding environmental influence, or natural selection model, it states that environmental factors select those organizational characteristics that best fit the environment (Aldrich and Pfeffer, 1976). In this section, I argue that the development of the cooperatives' population in Yucatan can be divided into two major phases, according to the source of influence in modifying the cooperatives' structure. The first phase is characterized by a great environmental influence, which leads to the appearance of homogeneous organizations, whereas the second one is distinguished by a major influence from within the same cooperatives. In this case, the results include the appearance of six different organizational structures. After that, different levels of ability of cooperatives in Yucatan to adapt are compared, in light of their
strategies and aids for adaptation. Then, the discussion is focused on constraints for adaptation, or on non-responsiveness in adapting.

### IV.7.1 Phases of adaptation at the population level

The rise of a common legal framework uniformly influenced cooperatives' organizational structure and behavior. The legal framework specified many aspects that characterized the inception stage of the cooperatives' sector in Yucatan. As a result, one could expect some consistency among cooperatives in existence at that time. Cooperatives emerged as direct responses to government mandates, their technological level of fishing, resource availability, and the development level of the market. Those factors were consistently influencing the newly formed cooperatives to adopt the same structure and to work at the same pace and intensity. This stage, when the external environment was substantially influential on cooperatives for adaptation, characterizes the 'coercive isomorphism' described by DiMaggio and Powell (1983). This process arises from political, governmental influences and determines the appearance of a homogeneous organizational structure in all cooperatives at that time.

Isomorphism is a consequence of a stabilizing natural selection, in which the external environment directed the appearance of similar cooperatives because of homogeneous extra-organizational factors. Latter, a diversifying natural selection has favored the appearance of a 'balanced polymorphism', which includes the emergence of different structures in noticeable proportions. This type of selection involves extra and intra organizational factors, whose relevant role depends on which one has more influence in determining adaptive responses. As a result, there are cooperatives in which the external environment has a substantial influence on adapting, while in others the environment has none or very little influence.

Despite the initial similarities of environmental factors and adaptive responses, it is reasonable to expect that socio-cultural differences emerge among cooperatives, even in those located in the same community. It may also be reasonable to expect that environmental factors change over time. In these kinds of changing conditions, different responses to specific environmental variations were developed by cooperatives seeking organizational stability (see Douma and Schreuder, 1998). At the population level, adaptive responses led to several stable organizational forms being reached either sequentially or simultaneously. If the process is simultaneous, it means that stable, gradual environmental changes are present. In the Yucatan context, cooperatives in communities with homogeneous social structure coupled with a stable and protective market are more likely to develop isomorphic structures. This is the case of the two communities on the West Coast, where laissez-aller and non-directive cooperatives (each type in one community) had emerged due mainly to an imitation process to cope with uncertainty. DiMaggio and Powell (1983) refer to this process as a 'mimetic isomorphism.'

On the other hand, stable organizational forms may be reached in a sequential trend due to gradual adjustment of environmental factors (e.g. shifting in demand, compliance of the national legal framework with international agreements) to organizational traits (e.g. successive political power of coalitions, emergence of a leader). For instance, the equilibrium is reached when the environmental condition $A$ is matched to the organizational form $A^+$. When a new imbalance occurs, a cooperative may strive to return to the previous steady state or to move to the next environmental condition $B$, by adjusting its organizational structure to $B^+$. It may be possible that some other cooperative designs a structure $B^*$, which may be even more successful in reaching equilibrium. The process stabilizes when organizational objectives are met and environmental variations do not force a change in the cooperative's structure. Therefore, different organizational forms may coexist in the same community, each of which may make slight adjustments in order to preserve the equilibrium with the environment.
This situation has arisen in the largest fishing community, where at least three different types of cooperative’s forms have emerged, namely participatory, supervisory, and autocratic.

Therefore, combinations of environmental conditions and organizational characteristics lead to viable organizational structures in Yucatan cooperatives. It is also true that some other combinations are not viable, which is consistent with the strategic choice of organizational orientation in the sense that there are alternative organizational forms, not just one suitable for any specific set of environmental conditions (Hage, 1980). The viability of these different forms affects one’s ability to assess the concept of adaptation efficiency in this context. It becomes very difficult to determine which organizational structure has been more effective in adapting to their particular environment. Under such circumstances, one can not easily answer if “low adaptation” cooperatives are less efficient that the ones that adapt to expand their operations.

One may think that survival is enough to exhibit adaptive efficiency if survival satisfies members’ aspirational level. The approach undertaken in this study does not contend directly with those questions, but rather emphasizes the fact that organizations change to fit their environment better without necessarily involving the idea of progress to complex or higher forms of organizational structure (see the natural selection model described by Aldrich and Pfeffer, 1976). In one extreme, low adaptation cooperatives do not respond to changes nor are prepared to adapt to new changes. Non-responsiveness to change seems to be a successful survival strategy for cooperatives, which are still in existence. On the other extreme, cooperatives adapted for expansion are those that make gradual adjustments not only to adapt to current changes but to be ready for future ones, as long as these can be reasonably foreseen.

Viewing cooperatives at their population level, it can be said that different, simultaneous equilibria have been reached since six different organizational structures had previously been identified, although autocratic cooperatives’ fate seems to be an unavoidable extinction. Most of the autocratic cooperatives are now idle or operating at a very low level. At this point, it is necessary to recall that different steady states with corresponding organization-environment relationships have come forth in part because decision-making units have differential influence on adaptation.

**IV.7.2 Cooperatives’ adaptive strategies and aids**

In this section, aids and strategies for adaptation are analyzed for each level of ability to adapt. As the Results section showed, laissez-aller and autocratic cooperatives had shown low adaptation because they depend largely on the environment for their performance, especially on the market factor. In seeking for the fish buyer’s “buffering action”, these cooperatives had established a mutualistically beneficial relationship: the fish buyer receives a supply of fresh, raw material at low price, while the cooperatives receive the immediate sale of their catches. In this way, cooperatives operate as a technical unit within a larger fishing firm, which has other units to process and trade the catches, and to perform administrative tasks. In addition, the buyer has the prerogative of defining the demand. Because they are concentrating exclusively on the technical task dimension (fishing), these low adaptive cooperatives do not have to deal with building up an organizational structure, defining authority lines and channels of communication, performing administrative duties, making strategic decisions, nor adapting to the environment. On the one hand, this condition is convenient for them because it brings stability at low price and effort. On the other hand, the drawbacks are the impossibility of accumulating capital for reinvestment, the lack of freedom to make changes, and the shortage of opportunities to spread out economic benefits into their communities.
The aid these cooperatives use for supporting the adaptive strategy is simply comparing their performance with other’s cooperatives. It is especially true in the case of laissez-aller cooperative since leaders expressed that it seemed that members of the first cooperative that negotiated with the market were “doing well”. Thus, other groups imitated the former in negotiating with fish buyers for an identical relationship. The only routine institutionalized has been then specializing in catching exclusively one species needed by the fish buyer.

As in the previous case, non-directive and consultative cooperatives exhibiting adaptation for survival had compared themselves for standard adaptive responses to the market environment, leading to a separate mimetic isomorphism, although these have two different strategies for adjusting to the environment. Non-directive cooperatives in the West Coast of Yucatan are highly homogeneous, so are consultative cooperatives in the East Coast. Adjusting strategies are the diversification of the catch composition, and negotiating with the environment. In the case of the market strategy, these cooperatives also seek protection from the buyer, although in this case the cooperatives have diversified their production. The dependency on the environment is more evident on non-directive groups’ political strategy since they seek the governor’s support through their federation, while consultative cooperatives lobby actively in addition to their own federation, showing more interest for solving legislative disputes.

Besides comparing themselves with others, participatory cooperatives that adapt for improvement employ ‘best and worse’ scenarios before adapting. Interestingly, scenarios include many environmental factors. Management boards explained that gaining access to or controlling processing facilities, having technological aids (computers) for administrative tasks, increasing their participation in the design of fishing policies, and improving their bargaining power, would better the development of their groups. A better condition was consistently envisioned as increasing incomes to augment their members’ and communities’ well being. The insights obtained by this scenario construction, provides some basis for analysis of the alternative consequences of a proposed action. Negotiating with the market and political environment strategies are similar to those for the consultative cooperatives, although the political influence of these cooperatives is higher than the previous ones. These tend to lead lobby actions and to make more proposals that are assertive when coping with legal changes. The other difference is the expanding of operations: one of the cooperatives got the concession to manage a gas station in its community. Although it didn’t imply a change in the organizational structure, it brought the necessity of vertically integrating the control and distribution of fuel. Hiring members’ relatives to operate the gas station and adding a new task to the administrative staff solved the situation.

Regarding cooperatives that adapt for expansion, in addition to comparing themselves with other cooperatives and creating scenarios, these perform information searching for supporting decision-making. Most of the information gathered is related to extra-regional markets, which is then compared with local conditions to be in a better position for bargaining. The searching experience and goals of the cooperatives’ members determined the information searching (Chen, 1984), and one could add by the searching options available to members. Market and political strategies are similar to those of previous cooperatives. Expansion of operations is done through vertical integration, which corresponds to their organizational development, since these cooperatives own processing facilities and have marketing experience. Under these conditions, they control the entire fishing process, from catching to selling, but they still want to expand their market through increasing their production’s quality. At the time of my fieldwork, personnel of these cooperatives were taking a course on improving the processing and hygiene of their catches, since this is a requirement established in the
North America Free Trade Agreement. Another institutionalized routine is the specialization on a few numbers of species owing to the fact that they have direct access to the demand and thus know firsthand the preferences of the market.

IV.7.3 Factors constraining adaptation

Success can be viewed as the agreement between what is expected and what can be done. If a person achieves a desired objective with the resources available, that person can be thought of as successful. Similarly, when an organization needs to adapt to a changing situation, resources have to be used to reestablish its equilibrium with the environment. If resources are sufficient, appropriate, and used wisely, it is more likely that the adaptation will be successful and the equilibrium reestablished. The opposite situation, or non-responsiveness to adaptation, occurs when there are not resources to accomplish the adaptive objective. Nevertheless, not only the lack of resources may constrain adaptation. A series of internal and external elements impinges upon a cooperative in the possibility of adapting. Such factors include environmental constraints, like financial dependency, and internal organization factors, like decision-makers' psychological traits, rigidity and the very same organizational structure (Hage 1980).

One important factor in analyzing the performance of decision-makers is that there are limits to knowledge and cognition. Simon (1955) pointed out that decision-makers pursue 'bounded' rationality. Similarly, Gans (1996) demonstrates that under conditions of incomplete information, it is impossible for decision-makers to rationally order alternative actions. Other authors have shown that decision-makers use heuristics to make judgments. Heuristics are advantageous in that they reduce time and effort in making reasonable predictions from alternative ways of action, although they can sometimes be misleading (Plous 1993). It was found through the interviews, that for most of the management boards, incomplete approximations were enough before making a decision. This situation might be influenced by the fishers' educational level and, as corollary, the confidence they have in their own experience. Leaders of authoritative cooperatives located in the community with the highest fishing industry development, feel that making decisions in this way will increase their stature before the other members. Management staff is non-existent in all cooperatives, and directors may rely only on bookkeepers for administrative decisions. In cases where leaders have been guiding the development of the cooperative for several years, allowing for increased experience and knowledge of the environmental conditions, biases on judgements may be reduced (although not totally), in supervisory cooperatives.

It may also happen that decisions are biased in a consistent way, resulting in under or over estimation of alternatives and their consequences. When mistakes are more visible and costly, and resources are scarce, leaders may be isolated, ridiculed, blamed, and even sued (see Whetten, 1987). At the same time that leaders credibility decreases, members' frustration increases, leading to a halt in participation, communication, and the capacity for adaptation. This scenario describes what happened to the autocratic cooperatives, where leaders exceeded their management abilities and also failed to change the structure of their organizations to reflect the dominant economic institutions (fishing firms) located in their community.

Although there is not evidence to assess the accuracy of group judgements, in democratic cooperatives, where members' pattern of participation is higher, collective memory and experience seems to increase the possibility of reaching accurate judgements. However, other factors also have to be considered in
judging the success of group decision-making, such as the complexity of the issue under consideration (Plous 1993).

Another factor that impedes adaptation is institutionalization of success. When cooperatives have adapted well to environmental changes and continue to adjust successfully, it is more difficult to change from what experience has shown to be the successful model of responding. This situation was found in one participatory cooperative, coupled with the preeminence of one coalition's values. The coalition is constituted by the founders of the cooperative, and has been guiding its development, in one way or another, since its inception in 1958. Considered as the guiding force of one of the most successful cooperatives in the state, this group is hesitant in changing its approach to pursuing the cooperatives' goals and allowing new ideas in management from younger members. No major crisis has occurred because the environment has continued fairly stable, especially the market and the legislation. However, it would be interesting to see how well it does if an imbalance emerges between the cooperative and its surroundings or among its working units.

The most common reason for lack of adaptation is the lack of resources, mainly capital, staff, and knowledge. There is an incompatibility between what is needed to be done and what can possibly be done. It may happen that the adaptation designed is the appropriate one, but due to the lack of resource bases it cannot be partly or completely implemented. This lack of implementation could give the impression that there is no commitment to adapt, or that the response is wrong. The deficiency in implementation may be due to scarce financial assets or to the lack of trained personnel, as in the case when adaptation requires the purchase, import, and operation of new technology. Extreme cases are when there is not enough money even to replace the same type of fishing equipment. Knowledge is a necessary resource also when an information search is needed, or when environmental monitoring is required. Knowledge increases information feedback that eventually may lead to choice of right action or adaptation. All cooperatives analyzed face, to a varying degree, a lack of resource base. The scarcity of capital is intimately linked to the financial dependency on middlemen, and is considered to be highly important as shown in Chapter III, which deals with the relationship with the fish buyers.

Knowledge deserves more attention owing to its connection with learning and adaptation. Learning is a source of knowledge. Learning at the organizational level, as it was mentioned in the introduction, is history-dependent, which means that it is based on the acknowledgement of past experience. Learning can be done from one's own experience or from other people's experience (Levitt and March, 1988). When it is from direct experience, or learning by doing, an action may be chosen if it is associated with success of reaching the objective. The situation corresponds to the representativeness heuristic described by Tversky and Kahneman (1974), in Plous (1993), which explains that people often make judgments "by the degree to which A is representative of B, that is, by the degree to which A resembles B". Inversely, an action won't be chosen if it is associated with failure. Learning by direct experience is the most common way of increasing knowledge across the fishing cooperatives in Yucatan since most of the interviewees, or in informal conversations, made statements like "we won't follow this course of action because it didn't work for us", or conversely "this strategy has been very useful, so we will use it as much as possible".

The other common source of learning is other peoples' or organizations' experiences. Mechanisms of diffusion of experiences are described by Levitt and March (1988), although in the case of Yucatan the second mechanism seems to be the most important. It is the spreading of experience or knowledge through the contact between members of different organizations. The process is highly efficient especially when two or more cooperatives are located in the same community or in nearby
communities, and may contribute to the mimetic isomorphism described above (see DiMaggio and Powell, 1983). It also contributes to the ecologies of learning; cooperatives are constituted by subgroups learning in an environment where other cooperatives are adapting and learning at the same time. This circumstance offers an interesting approach for analyzing the organizational adaptation process, but escapes to the scope of the present study. Nevertheless, diffusion is not problematic for Yucatan fishermen since there has been a high traffic of people, and consequently of ideas, along the coast from pre-Hispanic times.

Finally, one factor that has not been sufficiently addressed is setting learning as an objective rather than a by-product of sharing experiences or information searching. Viewing learning consciously as a specific outcome to be pursued may help cooperatives to improve their structure of knowing and experiencing. More studies must be addressed to understand the obstacles and aids for improving organizational learning at both levels individual (leaders) and organizational (assemblies).
CHAPTER V

THE INFLUENCE OF INTERMEDIARIES ON THE PERFORMANCE
OF FISHING COOPERATIVES

INTRODUCTION
The role of intermediaries in the development of fisheries, and other economic activities, has been amply documented (Desai and Baichwal, 1960; Stuster, 1980; Acheson, 1981; Miller, 1982; Hartman, 1986; Deutsch, 1995). Intermediaries have been regarded as corrupt (Oldenburg, 1987), triumphant entrepreneurs (Rosado and Rosado, 1995; Deutsch, 1995), and as uninterested in the full development of the producers (Desai and Baichwal, 1960). There are cases, however, in which intermediaries advance the performance of producers. This is especially true when an intermediary depends entirely on producers to meet marketing goals. If the producer’s performance is hampered, some intermediaries are likely to invest personnel, time and resources to increase that performance (Krause, 1999). However, intermediary standard behavior is to advance short-term loans to producers for purchasing short-lived production factors.

A simple definition of an intermediary states that the person is a trader who handles a commodity between producers and consumers. Under this definition, two important characteristics illustrate the type of intermediary analyzed in this study. One is the intermediary “in between” position, having direct contact with the two other parties and hence orienting the actions at his/her convenience. The other characteristic is that more than passing on a commodity, the intermediary may influence the social, cultural and economic development of the marketing system, including the producers and consumers.

Intermediaries’ range of activities includes marketing, money-lending, and provision of necessary production inputs, and it provides them with a strong bargaining position that helps them to concentrate on high economic margins (Hartman, 1986; Desai and Baichwal, 1960). The range of activities also eases long-lasting relationships with the producers because the latter can market their own production successfully, thus reducing market uncertainty (Acheson, 1981). The intermediaries dominant position is based also on the fact that producers usually concentrate on harvesting, making themselves financially, technically and administratively dependent. Because of this situation, producers lack i) sufficient technical knowledge to improve their production's quality, ii) appropriate managerial skills, iii) financial capacity for capitalization to implement reinvestment and pricing policies, and iv) the capability to adapt adequately to environmental changes.

V.1.1 Purpose of the chapter
Various types of producers and intermediaries have established variations of this general relationship, providing distinct market position to both parties. The purpose of this chapter is to explore and understand market factors that have contributed to differences in the performance of fishing cooperatives of the Yucatan state, Mexico. The chapter analyzes the relationship between the cooperatives and intermediaries from an economic perspective, to find out how this relationship has defined the development of the cooperatives. The influence of the relationship on the performance of cooperatives is expressed as the relative difference on satisfaction of cooperatives’ members and the average catch reported by these organizations during a five-year period. The chapter also develops categories of market position to reflect the strategies for the achievement of cooperative’s goals. The central tool for data collection and analysis is a mixed-methods design that includes a survey, face-to-face interviews, personal observation, and secondary sources. The results
are discussed in terms of their empirical support for social exchange theories, their contribution of new theoretical insights into the study of cooperatives, and the implications for the management of natural resources.

V.1.2 Research questions
The heterogeneous performance of fishing cooperatives has led to two major research questions: what are the major sources of differential performance of cooperatives? And how do those sources affect performance? Emphasizing market influencing those sources, important questions include: What kinds of relationships exist between cooperatives and market agents? What are the strategies of cooperatives to confront such agents? What are the market systems in which cooperatives operate and what is the market influence on the performance of cooperatives?

V.1.3 Hypothesis
To help answer the research questions, I tested an operational hypothesis to represent a particular prediction of the relation that exists among the factors under analysis.

The stronger the market position of a cooperative, the more satisfied its members and the more catch it reports.

V.1.4 Definition of terms
V.1.4.1 Intermediaries
Intermediaries, besides buyers and sellers, are an essential component of any market. Intermediaries play an important role of facilitating trade between producers and consumers of goods and services. There are different types of intermediaries, such as retailers, brokers, and middlemen. In this study, I define intermediaries as those economic agents who handle fish-based products from their producer to their consumer, and that produce similar products as well. By handling I mean that intermediaries buy, process, pack, and sell the catch of the cooperatives. The basic difference with middle-persons is that these people buy and sell products but they do not produce (Li 1998). In this chapter, I do not refer to other intermediaries, that is, middlemen or retailers, because they do not make exchange relations with fishing cooperatives.

V.1.4.2 Market position
The position of a cooperative in the market refers here to its role as producer of raw material. The strength of the position depends on the cooperative's freedom to bargain its catches, the degree of dependency on intermediaries, and the intermediaries' willingness to improve the market position of the cooperatives. Cooperatives have established different relationships with the intermediaries, varying their strength to influence the price of their production. Thus, a cooperative has a stronger market position when it has more freedom to seek better prices and its dependency on other market agents is small; in cases of dependency, the intermediary may contribute to improve the efficiency of the cooperative.

V.1.5 Organization of the chapter
The remainder of the chapter describes three frameworks. The first one is a conceptual framework that graphically describes the presumed relationship between the independent and dependent variables. Then, the theoretical framework explains the theories used for analyzing the variables and their relationships. The last one is an operational framework that describes the relevant conditions of operation for the cooperatives in Yucatan. Next, the methodology includes details on the information gathering process and the analysis of the data. The results show the market position
categories and the influence of intermediaries on the performance of cooperatives. Finally, the discussion focuses on the current exchange arrangements in the fishing market systems.

V.2 CONCEPTUAL FRAMEWORK

I advance the following conceptual framework as a graphical and organizational device to structure the research problem and to identify the key variables and the presumed relationships among them. The factors influencing cooperatives' performance are referred to as the independent variables, whereas performance is referred to as the dependent variable. Figure V.1 shows the relationship between the variables just defined. Among other factors, the way in which the independent variables are understood, designed and implemented can influence the performance of the cooperative.

![Diagram](image)

**Figure V.1. Market factors affecting the performance of cooperatives in Yucatan.**

The independent variable is the market position, which was considered because it has been shown that the development of cooperatives is often shaped by their financial dependency on intermediaries (Acheson, 1981; Medina, 1988; Hartman, 1986). In general, dependent cooperatives have no chance to bargain over the price of their catches, and no opportunity to seek better prices with other buyers. Consequently, their capability to capitalize and reinvest in production factors is limited. On the contrary, cooperatives that have access to market information and control over the processing and distribution of their production have more options to negotiate better prices for their catches.

V.2 THEORETICAL FRAMEWORK

The general analytical framework used to analyze the role of intermediaries in the development of cooperatives is social exchange theory. This theory analyzes how the structure of rewards and punishments in relationships affects patterns of interaction (Molm, 1991). In order to be consistent with its terminology, I regard intermediaries as buyers and cooperatives as producers. From the typology developed on different exchange relations by Befu (1977), the balanced exchange relation matches the market exchange association between intermediaries and cooperatives. In market or
balanced exchange, every thing received has to be reciprocated by its customary equivalent in a finite period (Sahlins, 1965, quoted by Befu, 1977).

A special case of balanced exchange is a relationship of dependence and power dominated by one of the participants. In this type of relationship, the development and satisfaction of one participant depends on his/her ability to adjust to the other participants' needs; the dependent participant may adjust by developing reciprocal and non-reciprocal strategies.

In their traditional form, exchange theories were restricted to the exchange of positive outcomes. However, the study of relations of dependence based on the control over negative outcomes is now widely accepted (Molm, 1987). Exchange of positive and negative outcomes applies to relations involving economic agents. Based on the expectation of reciprocity, dependence-power relations between functionally equivalent agents develop reciprocal strategies of rewarding and punishing. On the contrary, in power-imbalance relations, the use of a power advantage results in a decrease in reciprocity and an increase in non-reciprocal strategies, in which the power holder withholds rewards to exercise such power (Molm, 1991).

A special case of the power-imbalance relation is the buyer-dominated relationship, in which the buyer dictates the development of the producer. Buyers are active, proactive agents that determine the demand shifts. On the contrary, suppliers are more or less passive and typically reactive; their development strategies traditionally are constrained to suit the buyer's economic development (Lilliecreutz, 1998). However, producers may develop strategies to improve their market position. Some of these strategies are designed and implemented by the producers in the form of a supplier system (Churchman, 1968), whereas others involve an active role of buyers to improve producers' performance (Krause and Ellram, 1997; Krause, 1999).

My analysis also considers the lack of producers' freedom as a major characteristic of market exchange that constrains the development of the producers in the buyer-dominated relationships. The absence of interference by others defines the freedom to engage in exchange relations (Preston, 1984). This interference may be interpreted as market agreements reflecting a system of manipulation and coercion that reduces the choice of freedom. The solution to acquire freedom that Preston (1984) proposes is that besides absence of interference, an individual, before decision and action, should possess the relevant capacities and conditions for deliberate choice regarding the particular matter under consideration. Capacities are the skills, abilities, and understanding with respect to particular choices, whereas conditions refers to factors in a situation in which an individual makes deliberate decisions and actions possible (Preston, 1984). In this study, cooperatives' capacities refer to the understanding of market demands and the fishing skills to maintain and increase their fish supply. Conditions, on the other hand, refer to previously established relationships with fish buyers and the level of development of the contract law. Both previous relations and contract law are constraining conditions for acquiring freedom.

I mentioned earlier that an indirect way of measuring cooperatives' performance is by assessing the satisfaction among members. A relevant prediction of exchange theory is that satisfaction varies with the actual value of outcomes received relative to an expected value (Molm, 1991). The expected value is likely to depend on the aspirational level of each participant in the exchange. In light of this idea, low outcomes may be highly satisfying to an individual if they are higher than his/her aspirational value. Therefore, if the relative impact of different outcomes depend on expectations, then the relationship between outcomes and satisfaction should vary with the position of the participant in the relationship (Lee, 1988, quoted by Molm, 1991). Individuals in a disadvantaged position (producers) should not only receive lower outcomes, but also expect to
receive lower outcomes. Individuals entering a relationship in a disadvantaged position may still find it satisfying if outcomes are higher than their aspirational level.

Under the market exchange perspective described above, I show that the relationship between cooperatives and intermediaries in Yucatan is a power-imbalance type of social exchange, in which one of the economic agents (intermediaries) holds the power to control the exchange of raw material. Therefore, the relationship involves power and dependence. Due to their dependency, the cooperatives lack market freedom and legal support, show various degrees of satisfaction, and report different levels of production. Market strategies of cooperatives vary depending on being either in a balanced or imbalanced relationship.

V.3 CONTEXT FOR ANALYSIS
This section presents the general fish marketing system in which the cooperatives operate in Yucatan. The first part explains the general attributes of the relationship between cooperatives and intermediaries; the second part briefly examines the legal settings for regulating such relationship. Finally, the third part explains the existence of the fishing market in which producers and buyers engage in exchange relations with each other and with the markets.

V.4.1 Intermediaries-producers relationship
Several characteristics describe the relationship that intermediaries have established with small-scale producers. The most striking is that the intermediary dominates the relationship. More than a horizontal association it represents a vertical dependence of the producer on the intermediary. Technical and pricing inefficiencies in the marketing system seem to account for this situation. From the technical perspective, small-scale producers often are located far away from storage and processing facilities and communication infrastructure is non-existent or insufficient. Low-quality production results from unsatisfactory handling during harvesting and landing, as well as from the long time spent before reaching the market, especially in the case of highly perishable products (Deutsch, 1995; Hartman, 1986). Another characteristic is that production's backward (supply of production factors) and forward linkages (processing and marketing) are more than often controlled by the intermediary.

Pricing inefficiencies arise from the intermediaries financial strength to provide working capital, consumer goods, and production inputs coupled with the producers' inadequacy of obtaining credits and lack of storage, preservation, transport, and processing facilities (Hartman, 1986; Desai and Baichwal, 1960). Consequently, intermediaries are in the position to demand the mortgage of the production or the exclusive right to buy a share of it at the price they set (Miller, 1982).

A second characteristic of the relationship is the pervasive influence of the intermediaries on all aspects related and non-related to the production process. Producers often borrow money for community and familial events, and the debt adds to the one related to the production activity. In the absence of any other arrangements (lack of official regulation), intermediaries may direct the economic and even the social development of communities in a region, as well as the character of the local marketing system.

A third characteristic is that the relationship continues for long periods to the advantage of the buyers ensuring the supply of raw material. Once a producer borrows from the buyer, it is extremely difficult to free the former from the economic dependence (Desai and Baichwal, 1960). The situation is worsened because small-scale producers usually have a limited choice of outlets for the sale of (especially) highly perishable products (Hartman, 1986). On the contrary, buyers tend to
operate in a club-like economic organization on a collusive basis for price setting, facing no effective competition (Landa, 1979).

V.4.2 Legal framework for economic regulation

Regulation of the market exchange relations between cooperatives and fish buyers in Mexico is very general and ambiguous; hence, interpretation can be discretionary. It is precisely this attribute of the legal framework that has contributed to the strengthening of the dominant position of intermediaries. This section briefly reviews three central aspects of the market regulation in Mexico: antitrust legislation, taxation, and price control.

The Federal Law of Economic Competence regulates the contracting between economic agents with the purpose of avoiding monopolistic practices. The Federal Commission of Competence, depending administratively on the Ministry of Commerce and Industry, enforces this law. According to the law, contracts or associations whose objectives are to establish exclusive advantages to one of the economic agents are not legal. The advantages may be in the form of imposing prices or conditions on producers to sell their goods. Alternatively, any other action with effects which might diminish, damage, or hinder the free participation of economic agents in the market are forbidden to emanate from contracts or associations (Mexican Government official information web-site, www.cddhcu.gob.mx, accessed October 27, 1999). Equivalent legislation and regulatory agencies are found in India (Desai and Baichwal, 1960), the USA (Chen, 1984), and the European Union (Acocella, 1998).

Simultaneously, when trading their catches, cooperatives are obliged to comply with a (not necessarily written) contract. In general, contracts have to be bilateral (mutual agreement between the parties involved), reciprocal (both parties receive comparable benefits), and purposeful (benefits are certain from the beginning of the contract). However, due to market and environmental uncertainty, the contracts might also be contingent (benefits depend on an uncertain event) (Mexican Civil Code, Articles 11792 to 1859). In addition, the lack of an efficient enforcement of law has fostered the implementation of two types of contracts, which are not considered in the current legislation. One of these types is a verbal contract based on mutual trust. In this contract, conditions, due dates, and penalties for breaking the contract rely on the customary laws prevailing in the region. The other types of contracts are adherence contracts that are based on the condition that there is no previous agreement on the object of the contract and consent to its conditions. Since the dominant agent (the intermediary) fixes these conditions, the option for the producer is only to adhere to them. Adherence contracts are characteristic of monopolistic markets, such as telephone service, credit cards and bank credits. The legal vacuum has made verbal and adherence contracts institutionalized in the Yucatan fishing market without the arbitration of any official agency.

Taxation of cooperatives is the second legal issue that creates confusion. So far, cooperatives can apply for tax deductions for their constitution and general operations (General Law of Cooperative Societies) and for the purchase of production factors. Since the federal government has been trying to tax an increased number of sectors of the population and their activities, cooperatives are extremely secretive with respect to their economic performance. This is one of the main reasons why it is difficult to obtain reliable economic information from them.

The last form of market regulation is price control, which is a measure of direct control that involves setting maximum and minimum prices, depending on the objective of the government. If the objective is to guarantee a given income to the producer of a good or service, the government may set a minimum price. If the objective is to avoid the creation of monopolies, a maximum selling
price may be set. Both mechanisms are instruments for increasing the allocative efficiency (Acocella, 1998). In Mexico, however, the Federal Law of Economic Competence regulates only the setting of maximum prices (Mexican Government official information web-site, www.cddhcu.gob.mx, accessed October 27, 1999). The lack of regulation on minimum prices has created economic dependency of cooperatives on fish buyers as the latter fix prices low enough to maintain the debt of the former.

V.4.3 Fish marketing in Yucatan

The analysis of the fish marketing system (FMS) is of primary importance in order to understand the economic articulation of fishing cooperatives to broader socio-economic systems, such as the national and international markets. Figure V.2 shows the typical exchange arrangements operating in the study area. Cooperatives connect to the national and international markets through the intermediaries because of intermediaries' control of the areas of processing and marketing. The members of the cooperatives, and at lower level non-members, determine the complete supply of the cooperatives. Secrecy about catches bought from non-members makes it almost impossible to assess the percentage of the reported production coming from outsiders. Records from one cooperative in 1997, however, showed this percentage as 30% of its production rate. Therefore, the economic behavior of cooperatives allows viewing them as intermediaries, buying catches from fishermen and selling them to other intermediaries.

Fish buyers and cooperatives are not the only intermediaries in Yucatan. Table V.1 shows the pool of intermediaries that operate in the overall FMS. The scale of operations and the range of activities is the base of the hierarchization. To have an idea of the different scale at which private and social sectors operate, from 1993 to 1997 the former caught 82.1% of the total catch, cooperatives caught 8.2%, while other organizations caught the remaining 9.7%. Fishing firms concentrate almost the entire fish production of the state for commercialization. In 1997 they processed about 41,500 tons of fish-based products, representing a landing value close to $570 million pesos (SEMARNAP, 1998).

At the first level, private fishing firms are in control of the whole fishing process. Some engage in the supply of necessary production inputs and money lending to fishermen, specifically those firms whose fleets are reduced to a few boats that depend substantially on the producers for their supply of fish. On the contrary, fishing firms owning large-scale fleets depend entirely on their own harvesting assets, thus money-lending is uncommon and limited to the financing of producers' fishing trips and recovered immediately after the catches are sold.

Table V.1

<table>
<thead>
<tr>
<th>Level</th>
<th>Type of intermediary</th>
<th>Activity range</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Fishing firms</td>
<td>Harvesting, transporting, freezing, processing, exporting; money-lending</td>
</tr>
<tr>
<td></td>
<td>• Large fleet</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Small fleet</td>
<td></td>
</tr>
<tr>
<td>Second</td>
<td>Small buyers</td>
<td>Harvesting, ice-storing, transporting, trading; money-lending</td>
</tr>
<tr>
<td></td>
<td>• Individual buyers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Fishermen’s organizations</td>
<td></td>
</tr>
<tr>
<td>Third</td>
<td>Retailers</td>
<td>Trading</td>
</tr>
<tr>
<td></td>
<td>• Public market vendors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Street vendors</td>
<td></td>
</tr>
</tbody>
</table>
Small fish buyers represent the second level and include individuals and social sector fishing organizations. In both cases, the range of activities is reduced to money lending, ice storing, transporting and trading the catches with first level intermediaries. The main differences between individual and collective small buyers are that individual buyers work alone and do not own their boats, engage in trading for capital accumulation, and lend money (charging an interest which is recovered through fixing the price of the catches). Cooperatives and other fishing associations, on the other hand, are organizations owning their boats and fishing equipment, engaging in trading to finance the satisfaction of the members' daily needs, and lending money to members without charging any interest.

Retailers constitute the third level and include public markets and street vendors. The former buys fresh fish products every morning and sells them the same day. Each vendor in the public market sells approximately 100 Kg at most per day. Street vendors are an interesting phenomenon whose presence has increased since the beginning of the 1990s, and whose origin can be traced back to the two westernmost fishing communities in the coast of Yucatan. Women from these two communities buy different species of fish directly from fishermen after their daily fishing trip. Although there is not a clear pattern of kinship, it seems that the women engage in a long lasting relationship with specific fishermen for ordering their supply. The fish are processed, stored, iced at the household level, and sold the next morning in the capital city. Vendors transport the filets in buckets by bus, and offer them door by door. The scale of these operations is obviously low, between fifteen and twenty kilo a day. The number of vendors working at this level is unknown, as this type of activity still remains unregulated.

The connection that intermediaries carry out between producers and consumers is different at each level (see Figure V.3). The role of retailers is to connect individual fishermen to the local market; relative to the total production, the sale through this type of intermediary is insignificant, accounting for 1.7% of the total. Small buyers and most social sector organizations relate to the national and international markets through first level middlemen (fishing firms). Adding their own production, the latter concentrate 82% of the harvesting, and process and commercialize more than 95% of the total production. Only two cooperatives sell regularly and directly to the national market and sell a minor proportion to the local market.
Figure V.3. Articulation between producers and consumers through intermediaries (thicker arrows concentrate production and commercialization)

V.5 METHODOLOGY

IV.5.1 Data collection

Information regarding the independent variable, market position, was collected through a series of face-to-face, semi-structured interviews with members of cooperatives' board of directors. Questions focused on what type of relationship the cooperatives have established with market agents, especially with intermediaries. I was also interested in knowing the market strategies developed by these groups. Through the analysis of secondary sources of information, I wanted to identify the fishing marketing system operating in Yucatan. Regarding the dependent variable, performance, it was measured as the satisfaction of members and as total average catch per cooperative. I designed a questionnaire to measure the level of members' satisfaction, as described in Chapter I. The design of the questionnaires and interviews was done following Fowler Jr. (1995) and Czaja and Blair (1996). Information about the fish production per cooperative was obtained directly from the offices that the Secretariat of Fisheries has in the seven communities where cooperatives are located. Catch records contained information on the amount of Kg per species, per month for each cooperative, from 1993 to 1997. I calculated an average annual catch per species for each cooperative.

IV.5.2 Qualitative data analysis

The qualitative analysis of the data is based on a process of reduction and interpretation. By reduction and interpretation, I mean that I reduced a large amount of information to few categories based on the patterns of appearance of certain characteristics of cooperatives regarding their position in the fish market in Yucatan. I then analyzed and interpreted those categories to help answer the research questions.
The methodology for reducing and interpreting the information involved five basic steps: (1) grouping answers, (2) writing notes, (3) grouping for conditions, (4) creating categories, and (5) creating levels. In the first step, I read quickly the transcripts from the interviews to have first impressions from the data, and make major groups of answers. Groups were created after constantly comparing answers from different respondents to specific questions. Once I have these groups of answers, I wrote several notes to initiate the generation of conditions that emerged from the data, tracking them from the immediate answers from the respondents, to my notes and to these conditions. Conditions are the situations required to improve the performance of the cooperatives, and were grouped into general categories. Once I had the categories, I read the transcripts of the interviews again and compared them with the conditions created to accommodate the cooperatives presenting the same conditions into different levels. These levels represent groups of cooperatives that have created similar types of conditions to reach their objectives hence having different market position.

IV.5.3 Statistical data analysis

The statistical analysis of the data collected involved the application of correlation analysis to determine if there is a relationship between market position and performance, that is, if the second one increases as the first one does.

V.6 RESULTS

Different patterns of exploitation of marine resources, besides their distribution and abundance, depend on the technological advancement of the fishing equipment and the relationship established among economic agents within the fishing industry (Medina, 1988). Fishers have played a reactive role that has eased the intermediaries influence, influencing the development of the cooperatives as well as the fishing marketing system. Different groups of intermediaries dominate the relationship with cooperatives in particular fishing communities, determining patterns of market exchange and fish market systems. This section presents the assessment of the level of satisfaction and fishing performance for each cooperative according to four strategies for exchange association between first level intermediaries and fishing cooperatives in Yucatan. These strategies were equated to the market position of the cooperatives. Two marketing systems are described to frame these fishing exchange relations. The next subsection describes the role that, as intermediary, the Mexican government had in recent years, according to the leaders of two cooperatives. The last part of the section presents the statistical analysis of the data.

V.6.1 Data collection

Information to analyze the independent variable was collected from twenty-one interviews with representatives of the same number of cooperatives. In the case of the dependent variable, to measure the level of satisfaction, 155 questionnaires were applied to members of sixteen cooperatives. Five cooperatives in two communities, representing two different types of organizational structure, were not willing to participate in the survey. Therefore, results on satisfaction should be considered with caution. The total average catch per cooperative during 1993 to 1997 shows dissimilar levels of production, ranging from very few annual tons from barely operating cooperatives, to more than four hundred and fifty tons from the most productive ones. Catches are arranged and shown in the statistical analysis section.
V.6.2 Qualitative data analysis

V.6.2.1. General characteristics of the fish market

An oligopsonistic market structure and the coexistence of a group of capital-intensive industries and many labor-intensive social organizations characterize the fishery sector in Yucatan. The industries are family-based owned and different first level intermediaries manage each of them. Rather than investing directly in developing the state’s fishing infrastructure, intermediaries have invested in technologically advanced production factors to ensure their personal control over the whole fishing process (see Rosado and Rosado, 1995). Building access roads, docks, fishing refuges, light houses, power lines and water pipelines has been the government’s responsibility. Because the government built the infrastructure to facilitate the movement of raw material to the capital city and to the most developed coastal community, there is no horizontal articulation among the other fishing communities (Villanueva, 1990).

The commercial orientation of the fishery started in the beginning of the 1950s with a series of legal changes that sought to increase the control of the fisheries by Mexican individuals and enterprises. As the demand increased, diversified, and expanded to extra-regional markets, the producers had to rely on intermediaries to join those markets. Intermediaries emerged exogenously (government) and endogenously (local intermediaries) as a response to the lack of articulation between the producers and extra-regional markets.

The relationships established between intermediaries and cooperatives have been in most of the cases unbalanced. Because of their large-scale fleet, fishing firms catch larger fish inhabiting deeper waters. This fact, coupled with higher quality in handling and processing, supports their externally oriented business. This situation allows the intermediaries to manipulate market information and gives them advantage to monopolize pricing. The dominant position of intermediaries in the fishing market results in an irrational exploitation scheme where only few species are exploited at high rates, whereas more that twenty-five species with real or potential market value are under exploited. Intermediaries are more interested in satisfying foreign consumers demand (mostly Latin and Asian) which have a strong preference for lobster, groupers, octopus and snappers (Rosado and Rosado, 1995). The demand, concentrated on these species, is then transmitted to the fishermen.

From the early 1970s to the late 1980s, state-owned agencies practiced external intermediation to increase employment, allocate resources efficiently, and promote regional development, operating alongside local private fishing firms under a mixed oligopsony. Public intervention was thought to make possible the achievement of an efficient allocation of resources, which the local intermediaries were unable to guarantee. However, as I showed previously, public intermediation failed because it did not generate enough economic surplus to finance efficient cooperatives. This misallocation of resources was the result of inefficient management caused by constraints imposed by policy makers (they were more concerned with profit maximization through exportation), and improper relationships between outside managers and local producers (Pare and Fraga, 1994). Besides, none of the official measures gave fishers the appropriate knowledge and experience to articulate directly to the markets. The orientation of public enterprises as not seeking profit (and even operating at a loss) was not pursued (see Acocella, 1998).

Endogenous intermediation emerged during the 1950s and has continued up to now for three reasons. The first reason is economic; the intermediaries could economize on the transaction costs associated to bilateral exchanges. Transaction costs most frequently involved in exchange relations are searching for the good or service, negotiating an agreeable price, monitoring the compliance of the agreement, and enforcing the traders to comply with the agreement (Clower et al., 1988). The
second reason is technical because intermediaries were more efficient in establishing contact with consumers and producers, than consumers and producers were in making contact directly with each other. Efficiency in making contact among traders was due in part to the fact that all the resources of intermediaries were concentrated on intermediating, not in producing. The advantage of the intermediaries in the beginning was in trading, not in production. In fact, the intermediaries’ profit from selling at a higher price than the price they pay for the commodity in exchange (Li 1998).

The third reason is the way the society is structured in Yucatan. The main characteristic of the social structure is the possibility of creating highly personalized relationships that makes it easier to contact producers, especially in isolated fishing communities. Yucatan’s society has a legal framework which is poorly developed; hence, high transaction costs or externalities associated with contract uncertainty impede or make it difficult in formal exchange. The answer to this impersonal socio-economic structure, where bilateral exchange predominates, is personalism or particularism. Entering in personalistic exchange relations with those traders known as trustworthy or reliable in honoring contracts reduces uncertainty (Landa, 1979). Personal exchange relations are facilitated by the fact that individuals are embedded in a social structure with rules that serve to constrain their behavior. The social structure, thus, has provided a solid ground to the economic and technical factors for the emergence of local intermediation.

In advanced economies with well-developed legal frameworks for contract enforcement, the institutions of contract law facilitate impersonal exchange because of reducing contract uncertainty. These economies portray traders as egoistic individuals who are completely indifferent to the interest or identity of their trading partners. Standard theories of exchange depict competitive trade as an impersonal process of exchange that sets aside the transmission of altruistic impulses between traders (Landa, 1979, Befu, 1977). For example, Jevens has proposed a “law of indifference” that states that it is indifferent to the buyer or the seller with whom they do business as long as they obtain an homogeneous commodity at a customary price (Jevens, 1999). Furthermore, Wicksteed’s principle of “non-truism” states that altruism has no place in economic transactions (Landa, 1979).

The social structure inherent to the market exchange in Yucatan implies the existence of norms for regulating the behavior of intermediaries and producers, taking elements from their own socio-cultural contexts to build this structure. Intermediaries, mainly from the Capital City and the primary coastal community, traveled along the coast to buy fresh fish. As the exchange was consolidating, personal interactions started to be recurrent and regular, and norms for regulating the behavior emerged. The cooperative and the fish buyers set the norms of reciprocity and rules for exchange. For organizational development purposes, cooperatives urged their trading partners to behave based on a norm of reciprocity, appealing to the fish buyers’ moral duty of returning the preference of cooperatives in selling their production to the fish buyers. Rules of exchange were specifically set to govern what should be given in return in each particular situation between trade participants. However, according to the interviewees, fish buyers have always applied the non-truism principle when accepting to increase the price of the species. This behavior is associated with the seasonal availability of the species. When the cooperatives demand a higher price for the less abundant species at specific times of the year, the fish buyers agree but simultaneously reduce the price of the most abundant species. Wilson (1980) documents a similar behavior of fish buyers on the East Coast of USA.

Not all relations, however, were established in the same way. It is reasonable to expect that traders used a discriminatory screening to reduce, from all possible partners, the ones regarded as the most trustworthy. Relations then evolved based on the partners who reduced uncertainty and transactions costs, but increased mutual trust, aid, and reciprocity. It did not impede, however,
some relations from evolving to power-dependence associations, in which usually the fish buyer had the power over the cooperatives. This power has been used to force, influence or coerce compliance or agreement.

The amount of power is a function of the availability of alternative resources from which the dependent partner can obtain the resources needed (Befu, 1977). Alternative resources include opportunities of employment, processing service, connections to and information from extra-regional markets, capital, and other material resources on which the subordinated are dependent but do not have direct access to. Even though the members of the cooperatives had skills, experience and the exclusive right to catch the most valuable species, their degree of dependence is high from the beginning given their lack of processing facilities and marketing experience, which made it easier the fish buyers to increase their market position.

V.6.2.2. Market position of cooperatives

After performing the qualitative analysis of the data, I found that the major category regarding market issues was the position of cooperatives within this market (see Table V.2). No subcategories were created in this case. I identified five conditions that contribute to the position of the cooperatives in the market. The first one is whether the cooperative has the capability to negotiate the price of its catches. This means that some cooperatives have to accept the prices fixed by the intermediaries, whereas some others may fight for higher prices. Moreover, some are capable of fixing the price to their convenience.

The next condition is the signing of a contract for selling the catch previous to the season of a particular species. Some cooperatives compromise their catches before the fishing season based on verbal agreements, some others do sign a contract for the most valuable species, and even others expand the contract to all the species they catch. The pre-season contract or agreement is linked to the next two market conditions. One is that the contract or the verbal agreement often gives the fish buyer the exclusive right to buy the catch of the cooperative; therefore, only some groups have complete freedom to sell to who ever offers the better conditions of buying. The other related condition is that the buyer or the cooperative and the buyer have the right to enforce the exchange agreement. In some cases, this right is exclusive to the buyers, in some others to both parties. To my knowledge, there is no situation in which the cooperative has the exclusive right to enforce the agreement. Finally, there is a condition in which cooperatives may negotiate the price of their catches collectively or individually. Ideal democratic cooperatives (IDC) are assumed to be those that exhibit the following market conditions:

1. Having the capability of negotiating the price of their catches
2. Signing a pre-season contract to sell all the species they catch
3. Having the freedom to sell their catch to the buyers offering higher prices
4. Having the right to enforce the contract if the buyer does not comply with it
5. Collectively negotiating the price of their catches

Thus, cooperatives having equal sets of conditions were grouped in four different market positions. These are the same as the strategies for market exchange described in the following subsection.

V.6.2.3. Cooperatives' strategies for market exchange

In the DFMS the fish buyer relies on social sector fishing organizations for his supply. He has financed the cooperatives to acquire boats, engines, nets, and trucks for transporting the catches to the processing facilities located in the capital city. Through financing, the buyer has been able to establish dependence-power relations to various degrees with different cooperatives, which in turn have had to
develop non-reciprocal strategies to adapt to this type of relations. In the two communities participating in the IFMS, first level intermediaries own their fleets, so they self-supply their fishing firms, except for lobster, which is still caught exclusively by cooperatives. Patterns of interaction with social sector organizations and individual fishermen vary among the two communities. Cooperatives have also developed different non-reciprocal and reciprocal strategies. The following subsections describe these strategies, summarized in Table V.3.

**Table V.2**

<table>
<thead>
<tr>
<th>Category: Market position</th>
<th>Price-takers</th>
<th>Price-negotiators</th>
<th>Price-fixers</th>
<th>IDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negotiation of the catches’ price</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Pre-seasonal selling contract</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Freedom to sell catches</td>
<td>+</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Enforcement of exchange agreement</td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Collective negotiation</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0+</td>
<td>2+</td>
<td>3+</td>
<td>4+</td>
</tr>
</tbody>
</table>

**V.6.2.3.1 Non-reciprocal exchange strategies**

There are two non-reciprocal strategies, which are adopted by the majority of cooperatives to adjust their market position. The first is known as the price-negotiator strategy. Three characteristics distinguish price negotiators. First, both parties negotiate the price of all species, but the buyer has the exclusive right to buy the total catch of each cooperative. Second, there is a pre-season contract only for the most valuable species, whereas the price of other species is agreed verbally. Third, the fish buyer has the right to enforce exchange agreements. Enforcement is interpreted as the power to provide rewards or apply punishments. The fish buyer usually manipulates rewards and punishments through rising and lowering prices, and giving or withholding loans. Eight cooperatives dealing with the same fish buyer in the DFMS described earlier have developed non-reciprocal strategies in two different ways. The three non-directive cooperatives located in (S) have the weaker bargaining position due to three main factors. First, they deal individually with the buyer, giving him the chance to manipulate rewards and punishments on a one-to-one basis. Second, their annual level of operations is lower, between thirty-seven and sixty-eight tons, which represent 12% of the production this buyer gets from the eight cooperatives. Third, these cooperatives do not own any infrastructure; catches are kept in ice overnight in one-ton capacity boxes. Consequently, catches must be sold the next day from where they are landed.

Other four cooperatives, one participatory in (SF), the two consultative in (RL) and another consultative in (EC) display a stronger non-reciprocal, price-negotiator strategy. They handle their exchange relation with the fish buyer as a group, as they are organized as a federation of cooperatives. Negotiations are carried out between the intermediary, the management units of the cooperatives, and the federation. The rewards system is more balanced because this group of four cooperatives had caught 50% of the active cooperatives’ average production considered in this study. This high productivity is a resource base that allows these cooperatives to increase their bargaining power. The group is regarded as a supplier system. Churchman (1968) describes a supplier system as a group of components that interact with each other to fulfill a set of superior goals. Lilliecreutz (1998) notes that a supplier system is a survival strategy; however, in this case the strategy has helped the cooperatives not only to survive, but also to advance their organizational
development. For example, all of them have at least two trucks to transport the catches, offices, premises for social events, ice-storage facilities with varying capacity up to five tons, and an ice-making facility and one gas station. However, the buyer has partly financed these assets.

Table V.3
Market strategies developed by cooperatives in different fishing market systems

<table>
<thead>
<tr>
<th>Markets</th>
<th>Reciprocal Strategies</th>
<th>Non-reciprocal strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFMS</td>
<td>Price-fixers (1)</td>
<td>Price-takers (4)</td>
</tr>
<tr>
<td>DFMS</td>
<td>(*)</td>
<td>Price-negotiators:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supplier's system (strong)(2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Individual supplier (weak)(3)</td>
</tr>
</tbody>
</table>

(*)No cooperative found with reciprocal strategy in this market system
Numbers in parenthesis were used to apply the correlation analysis

From the perspective of the buyer, financing the advancement of the stronger cooperatives is an advantageous investment. Helping these cooperatives to acquire production factors guarantees him more efficient and reliable suppliers. The fish buyer has built upon the organizing capabilities of these cooperatives (which is not the case in the three previous weaker cooperatives), by providing them with sufficient equipment and facilities to increase the quantity and quality of their fishing performance. Finally, another participatory coop in (DB) is also categorized as a strong price-negotiator, although it has been able negotiate by itself with the fish buyer. The reason why this cooperative is not included in the suppliers’ system is that it is registered to another federation of cooperatives.

The second non-reciprocal exchange strategy is called price-taker, and is found in the IFMS model, in the five inactive autocratic cooperatives in (P), and the three laissez-aller cooperatives barely operating in (C). Characteristics of price-takers are: a) the buyer fixes the price of all species and has exclusive right to buy the catches; b) there is no contract to formalize any exchange agreement, and c) the buyer has the only power to enforce the agreements. Enforcement, rewards, and punishments are interpreted as before. The cooperatives in (P) developed this strategy according to the leaders of two of those cooperatives because the intermediary was the government; for this reason, in subsection V.6.2.4 I explain their situation as a special case.

On the other hand, the laissez-aller cooperatives in (C) seem to have the weakest market position; they have an even worse performance than the non-directive cooperatives. Besides dealing individually with the buyer, their level of operation is the lowest, reporting only 2.4% of the total production of cooperatives. They own practically no assets and the boats that they operate belong to the fish buyer. Unlike the strong price-negotiators, price-takers have not developed a supplier system to strengthen their bargaining power, nor do they have the support from the fish buyer to improve their performance.

V.6.2.3.2 Reciprocal exchange strategies
Reciprocal strategies, in a broad sense, refer to contingencies between functionally equivalent behaviors. Thus, providing rewards depends on the partner’s prior rewarding. Similarly, applying punishment depends on the partner’s previous punishment (Molm, 1991). In this study, fish buyers and three cooperatives in the IFMS located in (P) are functionally equivalent economic agents in the
sense that their market position is comparable when trading catches. The resource of the buyers (capital) is used to adjust their bargaining position in a similar way as the resource of the suppliers (catches). Again, since the contract law is underdeveloped, reciprocity is based on mutual respect, trust, and help.

The cooperatives applying the reciprocal exchange strategy are called price-fixers, since they have the possibility to negotiate and fix the prices of all the species they catch. Major characteristics of price-fixers are: a) both parties negotiate the prices of all species; b) the intermediary has no exclusive right to buy the total catch of the cooperative; c) there is a pre-season contract or verbal agreement for all the species, and d) both parties have the right to enforce exchange agreements. These cooperatives are the only ones that have the facilities to control the whole fishing process, including direct trade with either market (national and international), and can gain financial independence. In fact, one supervisory cooperative (RLP) from its inception in the late 1950s established its financial independence as a strategy for organizational development. The other two price-fixer cooperatives (TPM and PS) set the same strategy at the beginning of the 1990s when they learned the fate of other cooperatives in the same community (P) due to their financial dependence on fish buyers.

Other strategies have contributed to the financial independence of these cooperatives as well. Some of the strategies include keeping the fleet operating continuously, being receptive to technical innovations, seeking control of all phases of the fishery, and specializing in catching one or two valuable species. The production of the three cooperatives, although representing only 16.8% of the total catch of the cooperatives, is worth 12.7% of the total landing value. The high value is due to the quality of the handling and processing, making the catches a greatly appreciated commodity in extra-regional markets. According to the interviewees, no credit relation forces the cooperatives to accept prices fixed by the fish buyers, nor have the fish buyers the right to mortgage the catches. Since these cooperatives own their own processing facilities, their financial situation seems to be the strongest amongst the cooperatives in Yucatan, although no detailed information was disclosed to confirm this assumption.

V.6.2.3. Marketing systems

The fish marketing system (FMS) in Yucatan has deviant geographical patterns compared to an ideal market economy based on the central place theory (see Smith, 1974). Two models of the FMS were identified in the present study and were used to understand the (1) uneven channels of commercialization, (2) grouped-trade relationships between fishing communities and fishing firms located in urbanized communities, and (3) limitations on the articulation of cooperatives to the market imposed by fish buyers and by the inherent development problems of the fishing communities (see Chapter I). Within the two FMS models, there are three market centers where the production is concentrated and then distributed to extra regional markets.

V.6.2.3.1 Dendritic marketing system

The first model is called the dendritic fishing marketing system (DFMS), after the dendritic model described by Johnson (1970). DFMS involves five primary communities and a tertiary community. Figure V.4 shows that the geographical distribution of the primary communities in this model occupy mainly the easternmost side of the coast (DB, SF, RL, and EC). Only one community is located in the west (S). These five communities are connected vertically to the concentrating, high-level market center located in the capital city. Transport routes linking fishing communities to urban settings have developed in a linear way, becoming a separate branch-like system from which the DFMS model takes its name. Cooperatives transport their catches to the processing facilities of the single fishing firm in the heartland, to be processed, packed, and distributed to the extra regional markets. The owner of the firm gets complete information on prices from the fishing communities
and the national and international markets. On the other hand, cooperatives obtain regional price information from a single source: the same intermediary. This fish buyer controls the production of eight cooperatives' representing 70% (in weight and landing value) of the production of the cooperative sector. Taken at the state level, however, the production of these cooperatives represents only 6%. The advantage for this intermediary is that he concentrates the production of all small buyers and many other fishing organizations in the western community. His fishing firm has been considered as one of the three fishing firms with the highest level of industrialization (processing capacity), out of twenty two fishing firms registered in the local Fishing Industry Chamber in 1995 (Rosado and Rosado, 1995). Information obtained during the fieldwork in 1998 suggests that its position has not changed much since then.

![Dendritic fishing marketing system](image)

**Figure V.4. Dendritic fishing marketing system**

### V.6.2.3.2 In-site marketing system

The second FMS model in which cooperatives are engaged in is called the in-site fishery marketing system (IFMS) where producers and intermediaries are located in the same community. Figure V.5 shows that there are two communities with this spatial distribution; one is a secondary community (C), and the other a tertiary community (P) (see Chapter I). In this model, transportation costs are reduced to a minimum since the catches are practically landed at the processing facilities. Hence, the time spent between landing (supervised by employees of the buyer) and processing is minimized, increasing the quality of fish products.

In the fishing community (P) closest to the capital city, first level intermediaries rely more on their own large-scale fleet for fish supplying than on cooperatives. It is reflected in the fact that cooperatives' production that is channeled through fishing firms represents only 1% of the total produced by these organizations. Eight cooperatives out of the twenty-one analyzed are located in this community. From those eight, three directly control their own exchange relations. The other five have established a financial dependency on the fish buyers to complete their trips. The same condition of monopolistic pricing and catch mortgage in DFMS applies in IFMS. However, cooperatives in the latter have better access to market information either, via consulting directly to an official trading agency or via Internet. The IFMS is also found in the community (C). The most
important difference between the only three active cooperatives in this community and those in community (P) is that the former trade with a single fish buyer only during July and August when they catch and sell lobster.

![In-site fishing marketing system](image)

**Figure V.5. In-site fishing marketing system**

First level intermediaries concentrate and trade 98.6% of the total fishing production in Yucatan; the remaining 1.4% is traded by the cooperatives. That is, they trade only 17% of the cooperatives' production. A final comment on the marketing system is that intermediaries with small fleets justify purchasing catches from fishing organizations because their production is cheaper, because social sector capital is subsidized and has lower labor and technology costs.

**V.6.2.4. Government as intermediary**

The Mexican government implemented several measures in order to improve the market position of the cooperatives. The most important measures were creating and sponsoring credit institutions to provide soft credit loans, conducting marketing operations by state-owned agencies, and providing fish processing facilities to fishermen organizations.

The infrastructure needed for the development of the fishery as a relevant economic activity in the state was built during the 1970s (Villanueva, 1990). At the same time that freezing and processing facilities were completed and operated by social sector organizations, the construction of roads, docks, fishing refuges, and the supply of energy and water to those lodgings, benefited the whole fishing sector in general, including the private firms. During this time, two important state-sponsored firms were in charge of commercializing catches. One specialized in trading low-value species for domestic consumption, and the other focused on exporting high value species, such as shrimp and lobster, to international markets. Unforeseen problems such as incompatible working hours between fishermen and unionized plant workers, and the lack of experience on how to handle perishable products by managers hired by the government, among other things, led to an inefficient operation of these two firms. By the end of the 80s the government finally decided to privatize the fishing firm (Sanchez 1995). The exporting firm, although still under state supervision, is barely operating in Yucatan, where it exports lobster to the USA. An example of how this firm operates is
used here to demonstrate how state intervention indeed hampered the development of the cooperative sector, leading to the demise of some groups.

In 1972 the government granted loans to cooperatives to purchase the (until then) private shrimp fleet (Vasquez-Leon, 1995). However, old and technologically inefficient shrimp trawlers, insufficient catches to cover trip costs, monopoly pricing by the official agency, and high interest rates made it impossible for the cooperatives to recover enough capital to pay the loans. Table V.4 shows the monthly distribution of costs and benefits of operating a shrimp trawler in (P). As a fishing trip lasted twenty days, it is assumed here that twelve trips were carried out each year. The average catch was 0.5 tons per trip. The low level of production plus the high operational costs and interest rates resulted in a hardly payable deficit.

### Table V.4

<table>
<thead>
<tr>
<th>Item</th>
<th>Operation Costs</th>
<th>Discounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly interest payment</td>
<td>n/a</td>
<td>14,000</td>
</tr>
<tr>
<td>Trading agency discounts</td>
<td>n/a</td>
<td>1,261</td>
</tr>
<tr>
<td>Exporting commission</td>
<td>n/a</td>
<td>1,102</td>
</tr>
<tr>
<td>Exchange commission</td>
<td>n/a</td>
<td>804</td>
</tr>
<tr>
<td>Fixed costs</td>
<td>2,820</td>
<td>n/a</td>
</tr>
<tr>
<td>Variable costs</td>
<td>14,625</td>
<td>n/a</td>
</tr>
<tr>
<td>Subtotals</td>
<td>17,445</td>
<td>17,167</td>
</tr>
<tr>
<td>Total (costs + discounts)</td>
<td>34,612</td>
<td></td>
</tr>
<tr>
<td>Catch value</td>
<td>14,500</td>
<td>n/a</td>
</tr>
<tr>
<td>Monthly deficit</td>
<td>20,112</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Annual deficit</strong></td>
<td><strong>241,344</strong></td>
<td>n/a</td>
</tr>
</tbody>
</table>

Only after the exporting agency was able to sell the catch, was the payment to the cooperative made. The agency usually discounted between 7.6 and 8.7% of the total value as an exporting commission. If the trawler was purchased with a loan from the National Fishing Bank, the check issued by the exporting firm could be cashed only at that bank, which charged a 6% exchange commission; the bank controlled the exchange currency (from USD into pesos). The bank also discounted 40% of the catch value for principal and interest payments. Finally, if the coop did not have processing facilities, it had to pay $0.55 USD per pound of shrimp processed. Under these circumstances, at least five cooperatives in Progreso ceased operating as the results were totally opposite to the objectives of the policy of providing production factors sufficient for capital accumulation, reinvestment, and improvement of the market position of the cooperatives.

### V.6.3 Statistical data analysis

As predicted, there is a significant positive correlation between the performance and the market position of cooperatives (see Table V.5). The lower coefficient value for satisfaction seems to be due to the human variability in responding differently to the same stimuli, making it difficult to find a higher correlation.
Table V.5
Spearman's correlation coefficients for market position with satisfaction and catch per cooperative

<table>
<thead>
<tr>
<th>Market position</th>
<th>Satisfaction</th>
<th>Average catch Per cooperative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.663</td>
<td>0.879</td>
</tr>
</tbody>
</table>

Correlation was significant in both cases at the 0.01 level (1-tailed); sample size = 155 fishermen

The market position in this analysis reflects the strategy for exchange. The bargaining power gained through the market position is higher for price-fixers, whereas price-takers have the weakest bargaining power. In an intermediate position, price-negotiators are divided as weak and strong negotiators, depending on the way they negotiate, that is, as a system supplier or individually. Table V.6 shows the results derived from the strategies followed by the cooperatives in their exchange.

Table V.6
Market position expressed by exchange strategies and their numeric value, and performance per cooperative

<table>
<thead>
<tr>
<th>COOPERATIVES</th>
<th>MARKET POSITION</th>
<th>AVERAGE SATISFACTION</th>
<th>AVERAGE CATCH (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NUMERIC VALUE</td>
<td>STRATEGIES</td>
<td></td>
</tr>
<tr>
<td>RLP</td>
<td>1</td>
<td>Fixer n/a</td>
<td>433.11</td>
</tr>
<tr>
<td>SF</td>
<td>2</td>
<td>Negotiator (s) 2.9</td>
<td>484.38</td>
</tr>
<tr>
<td>DB</td>
<td>2</td>
<td>Negotiator (s) 2.0</td>
<td>318.39</td>
</tr>
<tr>
<td>TPM</td>
<td>1</td>
<td>Fixer n/a</td>
<td>178.88</td>
</tr>
<tr>
<td>PS</td>
<td>1</td>
<td>Fixer n/a</td>
<td>133.33</td>
</tr>
<tr>
<td>CA</td>
<td>3</td>
<td>Negotiator (w) 1.2</td>
<td>16.8</td>
</tr>
<tr>
<td>PG</td>
<td>3</td>
<td>Negotiator (w) 1.7</td>
<td>100.50</td>
</tr>
<tr>
<td>CP</td>
<td>2</td>
<td>Negotiator (s) 2.0</td>
<td>343.48</td>
</tr>
<tr>
<td>EC</td>
<td>2</td>
<td>Negotiator (s) 1.7</td>
<td>217.51</td>
</tr>
<tr>
<td>RL</td>
<td>2</td>
<td>Negotiator (s) 1.9</td>
<td>337.10</td>
</tr>
<tr>
<td>CCB</td>
<td>3</td>
<td>Negotiator (w) n/a</td>
<td>68.84</td>
</tr>
<tr>
<td>PD</td>
<td>3</td>
<td>Negotiator (w) n/a</td>
<td>37.15</td>
</tr>
<tr>
<td>CPP</td>
<td>3</td>
<td>Negotiator (w) 1.9</td>
<td>67.68</td>
</tr>
<tr>
<td>P T</td>
<td>4</td>
<td>Taker 5.0</td>
<td>4.90*</td>
</tr>
<tr>
<td>KKH</td>
<td>4</td>
<td>Taker 5.0</td>
<td>0.70*</td>
</tr>
<tr>
<td>JMC</td>
<td>4</td>
<td>Taker 5.0</td>
<td>18.73</td>
</tr>
<tr>
<td>PC</td>
<td>4</td>
<td>Taker 5.0</td>
<td>0.00</td>
</tr>
<tr>
<td>PCH</td>
<td>4</td>
<td>Taker 4.0</td>
<td>0.81*</td>
</tr>
<tr>
<td>NK</td>
<td>4</td>
<td>Taker 5.0</td>
<td>0.00</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td>Taker 4.0</td>
<td>2.48</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>Taker 5.0</td>
<td>0</td>
</tr>
</tbody>
</table>

(s) = strong; (w) = weak; *=one-year production; n/a=not available
relations. As predicted, members in cooperatives with a higher market position tend to be more satisfied and report higher average catches than members in cooperatives with weaker or no bargaining power. However, due to the lack of results for price-fixers cooperatives, it remains to be seen if their members qualify for the highest value for satisfaction.

V.7 DISCUSSION
The following discussion draws from the previous description of the different market systems found in Yucatan. The first part deals with the sources of power of intermediaries and how they influence the performance of cooperatives. In the second part, I analyze the performance according to the exchange strategy and the market system in which cooperatives are operating. A final comment is made on the cultural context of Yucatan and how it influences exchange relations in the fisheries.

V.7.1 The resource-power of the intermediaries
The alternative resources that fish buyers most frequently use to control the relationship are employment opportunities, information, and financing. For instance, regarding employment opportunities, in the westernmost communities (C) there is a large pool of unemployed peasants living in nearby rural communities. They have little experience and skills in fishing, but a huge economic need. When local fishermen are recalcitrant to the rules of the intermediaries, they send a bus to the rural communities to hire more obedient workers who are willing to go fishing longer and receive less payment. Since the boats and gear belong to the buyers, the peasants receive only a small commission of the landed value. As a result, local fishermen then are forced to accept the conditions of the buyers if they want to have a regular income. This situation explains in part the weakness of the price-taker cooperatives and their inability to negotiate fair prices for their catches.

Intermediaries play a special role in the case of market information. They use their particular knowledge about demand and quality of goods to buy and sell in the market. Their advantage is in terms of information, especially when it is restricted to a few intermediaries. Li (1998) assumes that intermediaries improve the efficiency within a market by inducing the producers to supply high-quality goods and bring them to consumers, who might not realize the trading opportunities without the intermediaries. When information about fish-based product demand is not accessible to producers, and supply information is not available to consumers, it is difficult to carry out the trading of these products. Intermediaries then, play a market-improvement role. However, intermediaries may also find it profitable to trade low-quality fish products and sell them to uninformed consumers when market information is scarce and hence consumers and producers cannot play a disciplinary role to restrain the behavior of the intermediaries. Thus, the intermediaries may manipulate market information to profit from the selling of a low quality commodity to consumers, and to induce producers to unfair agreements, reducing the freedom of producers to seek more fair exchange relations.

The most important resource by which fish buyers dominate their relation with cooperatives is their financial surplus. The benefits to the cooperatives from the financial assistance of the intermediaries include eliminating or reducing the need for self-financing investments and insuring the producers against random liquidity needs. By screening and monitoring the investment behavior of the producers, financial intervention certifies the producers and their investment quality, improving the welfare of the local market because it selects the most efficient and trustworthy producers to finance their production factors that should improve the quantity and the quality of their producing
(Bencivenga and Smith, 1991; Acocella, 1998). Results of financing cooperatives, however, have been mixed in Yucatan, and are discussed in the next subsection.

V.7.2 Financial dependency and non-reciprocal exchange strategies in the IFMS and DFMS

The general characteristics of non-reciprocal exchange strategies present in the DFMS result in a complete control of the production factors by the intermediaries in (C, S, DB, SF, RL, and EC). Although fishermen have access to trucks, boats, engines, nets, and other fishing equipment, they are distributed through credit schemes. In this way, the intermediaries control the technical level and the amount of equipment distributed within the cooperatives, giving the fishermen the faulty perception that they are the ones controlling the production factors. Under such circumstances, fishermen bear operation, maintenance, replacement, and insurance costs. At the same time, through this arrangement, the fish buyers transfer the investment risks (sinking) to the fishermen and the depreciation of the equipment. These types of arrangements are not exclusive of Yucatan but have been described in other areas (Norr, 1975).

Thus, there is a difference between real and perceived operation costs. The difference represents a surplus to the fish buyer and a deficit to the cooperatives; this implies that the latter are unable to pay back the loans and are continuously in need of re-financing. This situation determines the long-lasting relationship between cooperatives and fish buyers. It makes it very difficult for the fishermen to save up and reinvest in fixed assets (buildings, offices, processing facilities) or even to pay back their personal debts. The surplus capital of the intermediaries ensures a continuous financing of the fishermen as the lifespan of the production factors is short and because fish buyers and fishermen have different time horizons to pay back the loans.

The loan, or direct credit, is a financial instrument that fish buyers use to transfer purchasing power to fishermen who have deficits. The buyers seek to lengthen the maturity of the loan by encouraging the fishermen to acquire gear with a short lifespan and by fixing a low price for the catches. The price however has to be high enough to reduce the risk of insolvency, but low enough to keep the fishermen in need of financing. Thus, fishermen are still often in debt when they have to repair or replace their gear. Fishermen, on the contrary, prefer short maturities of their loans and a high price for their catches to avoid being re-financed under disadvantageous conditions. The fish buyers increase the price of the loans by manipulating the price of the catches until the loan’s maturity expires. In this case, credit becomes very costly for the fishermen. In short, fish buyers use direct credit to hamper the market position of the fishermen through mortgaging their catch thereby reducing their freedom to find more fair exchange conditions. Similar situations of coercion by fish buyers are described by Alexander (1979) in Sri Lanka, Faris (1972) in Newfoundland, and Lofgren, 1979) in Sweden.

Furthermore, since all equipment is either built in the capital city (boats) or has to be imported (engines, nets), fishermen are not only suppliers of raw material but also dependent on products manufactured outside their communities by members of the same group of intermediaries. Therefore, fish buyers concentrate capital within this relationship by: a) buying catches at prices they fix, b) selling production factors, c) charging interest by money-lending, and d) controlling the commercialization of the catches. At the same time, they save on the organization and training costs, since these costs have become the responsibility of the government. More savings are due to the fact that contract law is underdeveloped and verbal agreement reduces monitoring and enforcing costs to their minimum value.
V.7.3 Financial dependency and reciprocal exchange strategies in the IFMS

In this study I found that the exchange strategies in the IFMS in (P) are reciprocal since intermediaries and cooperatives have control on the entire fishing activity. Thus, intermediaries' dependence on the production of the cooperatives is minimal. In return, the cooperatives had had no necessity of asking for large financial support, except in those cases where cooperatives engaged in exchange relations with state-owned trading agencies. Those cooperatives, however, are now inactive. The three cooperative organizations ranked as price-fixers, that is, with the best market position, are located in this community.

The most evident influence from intermediaries on these operating cooperatives is the 'business atmosphere' in this community, which was ranked as displaying primary, secondary and tertiary activities. (P) is the most important fishing community on the coast because the fishing infrastructure here is the most advanced and efficient in the state. More than 50% of the fishing companies are located here, all with a medium or high level of industrialization (processing capacity) (Rosado and Rosado, 1995).

Of the three cooperatives mentioned, two of them (TPM and PS) were considered the most dynamic social organizations from 1993 to 1997, in terms of a high number of catches. Since the beginning of the 1990s, they have reflected the structure of a fishing firm. There is a supervisory leader who makes the strategic decisions, a manager who is in charge of the administrative tasks and is supported by professional bookkeepers, a group of efficient skippers who directly administer the budget of the vessels they operate, and a membership base that is highly skillful during the fishing season.

This situation provides empirical support to the previous evidence that people can learn by experience and by imitating the success of others. The impact of good decision-makers (first level intermediaries) on price-fixer cooperatives has been larger than the impact of bad decision-makers (leaders of other cooperatives with weaker market position). Organizations led by good decision-makers are less successful and are more likely to disappear from the market because these organizations go bankrupt. On the contrary, organizations led by good decision-makers are more successful and tend to survive and expand in the market (Offerman and Sonnemans, 1998).

V.7.3 Exchange relations and socio-cultural context

A special remark on the emergence of hierarchical relations within power dependence associations refers to the socio-cultural context within which a model of exchange relations is built. No exchange model can operate in a cultural vacuum. Specification of the cultural context is what brings life to the model (Befu, 1977). As it was mentioned earlier, the social structure presupposes the existence of social institutions that regulate and organize the behavior of interacting individuals (Landa, 1979).

The cultural context in which social institutions have emerged in Mexico in general, and in Yucatan in particular, can be traced back to its colonial legacy. After independence, the country inherited, from the late medieval Spain, its centralized authoritarianism, regional political bossism, and clientelism. This legacy bestowed upon all Latin American societies traditions of vertical dependence and exploitation. Putnam (1992) states that historically derived social contexts present individuals with a different set of opportunities and incentives. After three hundred years of Spanish domination and almost two hundred years of centralized decision-making, it is not surprising that inhabitants of fishing communities view their position in exchange relations as subordinated and dependent, first with respect to the government and then to the fish buyers. It also makes it easier for people with foreign origin to be among the most important fish buyers (Rosado and Rosado, 1995).
A decisive factor within the post-colonial legacy that facilitated the emergence of hierarchical structures is Catholicism, which is laden with symbolism and emotionalism (Ekeh, 1974). It predicts that social exchange will develop upon human sentiment. Norms and institutions to interact with others arise from individual behavior, and are maintained and supported only if they are able to satisfy the 'spiritual' needs of individuals (Befu, 1977). Accordingly, most of the members of the cooperatives mentioned that they were satisfied with the behavior of the fish buyers because they had been able to develop a personal, even emotional, relationship with them in contrast to the impersonal treatment received from private banks and the government.
CHAPTER VI

THE CUMULATIVE EFFECT OF INDEPENDENT VARIABLES ON PERFORMANCE

VI.1 INTRODUCTION

Fishing cooperatives have been amply studied from different perspectives. Some of the topics of interest in these studies have included the socio-cultural aspects of their members (Poggie and Fierro, 1986; Pollnac, 1985; Acheson, 1981), the cooperatives' potential as promoters of local development (Pollnac, 1988), emphasizing economic development (Lorendahl, 1996), or as channels to implement fisheries management regulations (Kurien, 1988; Jentoft, 1989; Pollanc, 1994). However, most of these studies are descriptive and the analyses are qualitative. Only in a few cases have the studies tried to explore the relationship of several factors and their influence on the performance of the cooperatives by applying statistical analyses (Lubis, 1992; Poggie et al., 1988; Baticados, 1998).

For example, Poggie et al. (1988) analyzed community services, cooperatives' assets, and cooperative membership and management as factors influencing the success, or failure, of fishermen's cooperatives in Ecuador. All these factors were analyzed through factor analysis with orthogonal rotation. Major findings of that study were that cooperative's facilities, assets, and social solidarity are the most important predictors of cooperatives' success. On the other hand, Baticados (1998) used such statistical analyses as correlation, ANOVA, factor analysis and multiple regression analysis to analyze their field data from Central Phillipines. They found that the major factors affecting the success of cooperatives in that area are background, membership, management, and economic factors. These examples show that statistical analyses may be a powerful analytical tool to understand the factors that affect the performance of organizations in general, and cooperatives in particular.

Multivariate statistical methods provide ways to analyze phenomena where many independent and dependent variables correlated with one another to varying degrees. Multivariate statistical techniques reveal and assess complex interrelationships among variables in statistical inference (Tabachnick and Fidell, 1996). In this chapter, as I did in previous ones, I have defined the independent variables but had no control on the assignment of cooperatives to levels of these variables. The independent variables were defined based on naturally occurring differences among cooperatives, and such differences were used to predict some other non-experimental (dependent) variables, such as catch and satisfaction. The distinction between independent and dependent variables was arbitrary; therefore, I did not attempt to attribute causality to any independent variable.

VI.1.1 Purpose of the chapter

The major purpose of this chapter is to identify whether there is a cumulative effect of the independent variables on the performance of Yucatan cooperative organizations. I analyzed these variables separately in the previous chapter and found that each of them has at least a positive correlation with the dependent variable. However, it is reasonable to expect that they have some kind of additive effect on the performance of cooperatives. That is, there may be a combination of effects between the number of rules, the ability to adapt, and the market strategies in a way that performance is augmented if the effect is positive, or diminished if the effect is deleterious.
VI.1.2 Research questions
The research questions made in this chapter are: Is there a combined effect of the three independent variables on the performance of the cooperatives? If so, which of these variables is more important in predicting the variability on performance?

VI.1.3 Hypothesis
The more operational rules, higher ability to adapt and autonomous market position, the more likely the cooperative will be successful in terms of average catch.

VI.1.4 Conceptual framework
The conceptual framework, Figure VI.1, assumes that an increased number of operational rules relate to a higher organizational development that allows a cooperative to increase its ability to adapt to the changing external environment. These rules also facilitate the development and implementation of more effective market strategies that provide the cooperative with enough autonomy to establish reciprocal relationships with other market agents. Thus, operational rules, ability to adapt, and market position together influence the performance of the cooperatives.

VI.2 METHODS
The methods used to analyze the effect of the three independent variables on the performance of cooperatives are multivariate methods. I chose multivariate analysis because I needed it to analyze several related variables simultaneously, considering each variable equally important at the beginning of the analysis. Multivariate statistical methods allowed me to study the joint relationships of variables that are positively correlated, as I showed in previous chapters. I selected specific multivariate methods to classify and order the data from the survey, and to predict and infer from this information certain characteristics from the sample to the population of cooperatives in the study area. The methods are: correlation analysis to measure the strength of a potential linear relationship between variables; cluster analysis to classify the cooperatives into hierarchical categories based on their similarities; multidimensional scaling to construct a 'map' to show the relationships between the number of cooperatives given only a table of similarities among them (see Manly, 1992); and multiple regression to predict the response of the dependent variable as the independent variables change their values. Table VI.1 shows the variables entered in each multivariate method.

VI.2.1 Data screening and correlation
The first step I took in the multivariate analysis of the variables influencing performance was screening the data from the surveys and interviews. This step consisted of plotting a matrix of bivariate scatter diagrams between independent and dependent variables and checking for normality, linearity and the presence of outliers. I used the values of the variables summarized in Table VI.2. Since I did not find an intuitively reasonably linear association of categorical variables (adaptive ability, market position and average satisfaction), I transformed these variables into their natural log value, plotted them and checked again for normality, linearity and outliers.

However, categorical variables can not be linearized after transformation (Norusis 1997). Since transformations do not reorder the data values, the categories remain the same after transformation. For this reason, nonlinear methods were used to interpret the association between variables. For example, I chose Spearman's rho correlation analysis or rank correlation because its computation is not sensitive to asymmetrical distributions or to the presence of outliers. This analysis uses the rank order of each data value, and the assumption of normality is not required.
Figure VI. 1. Variables, and their relationship, analyzed in this study
Table VI.1. Summary of the multivariate methods used for statistical analysis

<table>
<thead>
<tr>
<th>Method</th>
<th>Purpose</th>
<th>Introduced variables</th>
<th>Measurement scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation</td>
<td>Measure association</td>
<td>• Organizational structure</td>
<td>Ordinal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Score of rules</td>
<td>Ratio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adaptive ability</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Market position</td>
<td>Ordinal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Average catch</td>
<td>Ratio</td>
</tr>
<tr>
<td>Cluster analysis</td>
<td>Ordination</td>
<td>• Adaptive ability</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Market position</td>
<td>Ordinal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Average catch</td>
<td>Ratio</td>
</tr>
<tr>
<td>Multidimensional</td>
<td>Ordination</td>
<td>• Average catch</td>
<td></td>
</tr>
<tr>
<td>scaling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple regression</td>
<td>Inference</td>
<td>As IV:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Organizational structure</td>
<td>Ordinal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Score of rules</td>
<td>Ratio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adaptive ability</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Market position</td>
<td>Ordinal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Average catch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>As DV:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Average catch</td>
<td>Ratio</td>
</tr>
</tbody>
</table>

VI.2.2 Cluster analysis

The next step was to disclose the grouping structure of the cooperatives relative to each other based on their attributes. I used cluster analysis and multidimensional analysis to place the cooperatives in a graphic representation of such positions. The goal of applying cluster analysis was to identify homogeneous groups, or clusters, of cooperatives. For grouping in cluster analysis, group membership for all cases is unknown, that is, knowing to which group a cooperative belongs is not a necessary condition to perform the analysis.

There are several methods for grouping cases into clusters. I used a method called ‘agglomerative hierarchical cluster analysis’, which groups cases (cooperatives) into bigger and bigger clusters until all cooperatives are members of a single, biggest cluster. The criterion I chose for deciding which cooperatives or clusters should be grouped at each step was a ‘single linkage’ or ‘nearest neighbor technique’ and is based on a matrix of similarities between pairs of cooperatives. With this technique, the first two cooperatives combined were those having the largest similarity. The similarity between the new cluster and individual cooperatives is then calculated as the largest similarity between an individual cooperative and another cooperative in the cluster. At every step, the similarity between two groups of cooperatives is the similarity between their two more similar cooperatives (Norusis, 1997).

VI.2.3 Multidimensional scaling

As introduced earlier, multidimensional scaling (MDS) was also used to indicate the degree of similarity between two or more cooperatives, although in this case a point in a multidimensional space represents each cooperative. Two points that are close together represent two similar cooperatives, and two points that are far apart represent two dissimilar cooperatives. The space is traditionally two- or three-dimensional space, but it can have more dimensions. I considered several factors to decide which type of MDS to use.

The first factor was the scale of measurement of the data. Since I measured the independent variables in an ordinal scale, I used a ‘nonmetric MDS’. Another factor related to the data is their shape, which can be square and rectangular. In the first one, rows and columns refer to the same
cases or objects, whereas in the second shape rows and columns represent different sets of items. I used a ‘rectangular shape’ of data because I have a single rectangular matrix in which columns represented the cooperatives and the rows represented the variables. Different items in the rows and columns lead to the next factor for choosing a type of MDS, that is, the conditionality of the data. When data are ‘matrix conditional’ the numbers within the matrix are on the same measurement scale; when data are ‘row conditional’ these numbers are on a different measurement scale. I used the matrix conditionality because the variables in the rows represented the variables measured on an ordinal scale, that is, the organizational structure, the ability to adapt, market strategies, and satisfaction.

VI.2.4 Multiple regression analysis

Before attempting to apply multiple regression analysis to find an equation to predict the dependent variable values according to changes in the independent variables, I made several transformations to the market position and adaptive ability variables. Since these variables have only four categories or values, the dependent variable values concentrated in four groups along the independent variable axis. Therefore, from the original data, market position and ability to adapt did not yield a linear association with the performance of the cooperatives. I transformed these variables into their logarithm, quadratic and weighted least square values to linearize and re-examine them. In every transformation, however, the coefficient of determination \( R^2 \) was smaller than 0.5, that is, the resulting equations explained less than 50% of the dependent variable variability. That is, transformations did not linearize the relationship between these variables.

Nevertheless, I applied multiple regression analysis to all the variables since I still strongly considered that all of them have an influence on the performance of the cooperatives. I used a type of regression known as statistical regression (stepwise) to build a model to predict the response of the dependent variable. In this type of regression, the order of entry of variables is based on statistical criteria to avoid subjective bias in their selection (see Tabachnick and Fidell, 1996).

In stepwise variable selection, after entering a new variable in the model, any variable already in it that is no longer a significant predictor is removed. That is, variables whose importance diminishes are removed as additional predictors are added. Hence, there is one criterion to enter a variable and one to remove a variable. For entering a variable, first the two variables with the highest \( R^2 \) are selected. At each additional step, the variable that results in the largest increase in multiple \( R^2 \) is added. Entering variables stop when there are no more variables that result in a significant increase in \( R^2 \). In order to remove a variable, the variables in the model are examined at each step to remove those variables that change \( R^2 \) least. Removing variables stops when removal of any variable results in a significant change.

VI.3 RESULTS

VI.3.1 Correlation

Table VI.3 shows the non-parametric correlation between all variables. I excluded two cooperatives with extreme values of average catch (outliers), therefore the sample size is 19 cooperatives when considering catch and 14 when considering satisfaction. All correlation coefficients are statistically significant at 0.01 level (1-tailed). The table shows that the correlation between the independent variables and the average catch is stronger than with the satisfaction, especially in the case of organizational structure and scores of rules. For adaptive ability and market position, their correlation coefficients with catch and satisfaction are more similar. Because of the correlation coefficient values, it is possible to say that small values of the independent variables are, in general, associated with small values of the dependent variable. The same applies to the larger values.
### Table VI.2.
**General results of independent and dependent variables per cooperative**

<table>
<thead>
<tr>
<th>Cooperative id</th>
<th>Organizational structure</th>
<th>Rank</th>
<th>Total score of</th>
<th>Market position</th>
<th>Adaptive ability</th>
<th>Average satisfaction</th>
<th>Catch (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLP</td>
<td>Participatory</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>433.11</td>
</tr>
<tr>
<td>SF</td>
<td>Participatory</td>
<td>1</td>
<td>53</td>
<td>2</td>
<td>2</td>
<td>2.9</td>
<td>484.38</td>
</tr>
<tr>
<td>DB</td>
<td>Participatory</td>
<td>1</td>
<td>52</td>
<td>2</td>
<td>2</td>
<td>2.0</td>
<td>318.39</td>
</tr>
<tr>
<td>TPM</td>
<td>Supervisory</td>
<td>2</td>
<td>48</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>178.88</td>
</tr>
<tr>
<td>PS</td>
<td>Supervisory</td>
<td>2</td>
<td>47</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>133.33</td>
</tr>
<tr>
<td>CA</td>
<td>Supervisory</td>
<td>2</td>
<td>43</td>
<td>3</td>
<td>2</td>
<td>1.2</td>
<td>16.8</td>
</tr>
<tr>
<td>PG</td>
<td>Consultative</td>
<td>3</td>
<td>43</td>
<td>3</td>
<td>2</td>
<td>2.7</td>
<td>100.50</td>
</tr>
<tr>
<td>CP</td>
<td>Consultative</td>
<td>3</td>
<td>42</td>
<td>2</td>
<td>2</td>
<td>3.0</td>
<td>343.48</td>
</tr>
<tr>
<td>EC</td>
<td>Consultative</td>
<td>3</td>
<td>40</td>
<td>2</td>
<td>2</td>
<td>1.7</td>
<td>217.51</td>
</tr>
<tr>
<td>RL</td>
<td>Consultative</td>
<td>3</td>
<td>40</td>
<td>2</td>
<td>2</td>
<td>1.7</td>
<td>337.10</td>
</tr>
<tr>
<td>CCB</td>
<td>Non-directive</td>
<td>4</td>
<td>36</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>68.84</td>
</tr>
<tr>
<td>PD</td>
<td>Non-directive</td>
<td>4</td>
<td>35</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>37.15</td>
</tr>
<tr>
<td>CPP</td>
<td>Non-directive</td>
<td>4</td>
<td>28</td>
<td>3</td>
<td>3</td>
<td>1.9</td>
<td>67.68</td>
</tr>
<tr>
<td>PT</td>
<td>Autocratic</td>
<td>5</td>
<td>18</td>
<td>4</td>
<td>4</td>
<td>5.0</td>
<td>4.90*</td>
</tr>
<tr>
<td>KK</td>
<td>Autocratic</td>
<td>5</td>
<td>17</td>
<td>4</td>
<td>4</td>
<td>5.0</td>
<td>0.70*</td>
</tr>
<tr>
<td>JMC</td>
<td>Autocratic</td>
<td>5</td>
<td>13</td>
<td>4</td>
<td>4</td>
<td>5.0</td>
<td>18.73</td>
</tr>
<tr>
<td>PC</td>
<td>Laissez-faire</td>
<td>6</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>5.0</td>
<td>0.00</td>
</tr>
<tr>
<td>PCH</td>
<td>Autocratic</td>
<td>5</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>4.0</td>
<td>0.81*</td>
</tr>
<tr>
<td>NK</td>
<td>Autocratic</td>
<td>5</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>5.0</td>
<td>0.00</td>
</tr>
<tr>
<td>E</td>
<td>Laissez-faire</td>
<td>6</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>4.0</td>
<td>2.48</td>
</tr>
<tr>
<td>B</td>
<td>Laissez-faire</td>
<td>6</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>5.0</td>
<td>0</td>
</tr>
</tbody>
</table>
The correlation between independent variables is also strong, anticipating a potential multi-collinearity problem for the multiple regression analysis. Multi-collinearity means that there are redundant variables that may not be needed because they may weaken the analysis (they inflate the size of the error terms). For most multivariate analysis, it is not recommendable to include variables with a bivariate correlation of 0.70 or higher in the same analysis (Tabachnick and Fidell, 1996).

### VI.3.2 Cluster analysis

Since five cooperatives did not participate in the survey to measure members' satisfaction, and since the SPSS cluster analysis estimates the statistics using only cases with no missing values for any variable entered, I used only the average catch as a measure of cooperatives' performance. I also decided to exclude two cooperatives with extreme catch values, thus analyzing 19 out of 21 cooperatives. I visually represented the results of the cluster analysis with a 'dendrogram' (Figure VI.2). This display identifies the combined clusters and the values of the coefficients (the squared Euclidean distance between two cooperatives) at each step. (Actually, the dendrogram in Figure VI.2 does not display the actual similarity estimates, but a scale from 0 to 25. However, the ratio of the similarities between steps is preserved).

The dendrogram has to be interpreted from left to right, and the vertical lines join clusters at the distances indicated on the scale. It is hard to tell the sequence in which the first clusters are formed at the beginning because there are five clusters with scale value equal to one. Starting from the top, the first included cooperatives from 15 to 11. There are three more clusters with two cooperatives (5 and 6, 4 and 8, and 1 and 2), and one grouping three more cooperatives. However, at the following stages the similarities between these groups are smaller thus it is easier to identify clusters. It seems that the analysis identifies three different groups of cooperatives. Using the label of the cases, the first cluster (scale value = 1) groups ten cooperatives with laissez aller (E, B and PC), non-directive (CCB, CPP and PD), and autocratic (NK, PCH, PT, and KKH) structures. The second cluster (scale value = 2) groups two supervisory (PS and TPM) and two consultative (PG and EC) cooperatives. This second cluster and the first one form a more similar cluster, with a scale value of 5.

The third cluster (scale value = 4) groups two more consultative cooperatives (CP and RL) with the participatory cooperatives (DB, RLP and SF). These five organizations are democratic and have the highest dissimilar value with the rest of the cooperatives. It seems that the factor that is influencing the way cooperatives cluster the most is the average catch reported in the five-year period under analysis. The order of the cooperatives, from top to bottom, on the left of the dendrogram goes from the least to the most productive cooperatives in Yucatan. In fact, the last five cooperatives are the ones that reported more than 300 tons per year from 1993 to 1997.
Figure VI.2. Hierarchical cluster analysis. Dendrogram using average linkage (between groups)
VI.3.3 Multidimensional scaling

I checked three measures to determine how well MDS describes the original data. The 'S-stress' is a measure of fit that ranges from 1 (worst possible fit) to 0 (perfect fit). The s-stress is calculated iteratively to check the improvement of the s-stress value at each iterate. The calculations are based on the estimated Euclidean squared distances between observations (see SPSS for more detail in calculating Euclidean distances). The s-stress value obtained in this case is 0.021, which is much closer to 0 than to 1, describing a very good fit between the original data and the similarities created by the model (Kruskal and Wish, 1978). The next measure of fit is the Kruskal's stress measure, which is defined in the same fashion as the s-stress, except that distances are used instead of squared distances. The criteria to define the worse and best fit are similar as in s-stress measure. The Kruskal's stress value was 0.027, which is similar to the previous value leading to a similar conclusion on the goodness of fit. The last measure of fit is the squared correlation coefficient (RSQ) which is the squared simple correlation between the original similarities among cooperatives and the distances among points calculated by the analysis. RSQ represents the best fit when its value is equal to 1. The value obtained in this study is RQS = 0.999, which is an almost perfect fit.

The near perfect fit defined by the three fit measures is represented in Figure VI.3, which is scatter plot of the raw data in the horizontal axis, against the calculated distances in the vertical axis. The scatter plot shows some dispersion around the fit line that goes from the lower left to the upper right, more precisely around number 2 in the horizontal axis. The near perfect fit occurs because the data have essentially no error and also imply that a two-dimensional space may be sufficient to explain the similarities among cooperatives.

![Figure VI.3. Scatter-plot of linear fit](image)

As introduced earlier, the purpose of MDS is to construct a map of the positions of cases or objects relative to each other. Their corresponding independent and dependent variables' values are the information used to specify how different they are. Figure VI.4 represents the 'map' of the similarities among cooperatives, a point representing each cooperative. The distance from one
point to another represents how similar or dissimilar they are regarding operational rules, adaptive ability, market strategies, and performance.

As it happened with cluster analysis, there are some ‘neighborhoods’ that group similar cooperatives. For example, in the upper part of the up-right quadrant the participatory cooperatives are concentrated, whereas some autocratic (only JMC is illustrated) and laissez-aller (only PC is illustrated) are located in the up-left quadrant. Closer to participatory cooperatives are supervisory (CA, TPM) and consultative (EC, CP) cooperatives. Non-directive cooperatives (CCB, CPP) are grouped close to the zero line of dimension 1. Along this dimension, the position of the cooperatives seems to reflect, from right to left, their level of production and organizational structure. That is, the positioning goes from the most productive and organized cooperatives to the least.

![Figure VI.4. Multidimensional scaling ‘map’ of cooperatives](image)

Figure VI.4 also shows a rather striking yet usual phenomenon known as ‘horseshoe’. Although the graph is two-dimensional, it is apparent that the data are arranged in a very special configuration. It consists of a nearly one-dimensional configuration which has been ‘bent’ around into a horseshoe shape. It seems that only one curvilinear dimension is sufficient to give a reasonable description of the data, and my interpretation is that this dimension represents cooperatives’ performance expressed in terms of production or average catch. The arrangement of the points along the dimension 2 is less clear, and it may be a result of the combination of the other variables. The horseshoe phenomenon is not entirely understood, thus the only clue available for interpretation is the position of the cooperatives along the horseshoe curve (see Kruskal and Wish, 1978).
VI.3.4 Multiple regression analysis

Table VI.4 shows the summary of the statistics from the stepwise multiple regression. In the row of model 1 it shows that only one predictive variable (scores of rules) meet the criteria for selection. This variable explains 71% of the dependent variable variability, the average catch of cooperatives.

The regression coefficients for the model are shown in Table VI.5. The observed significance level for the predictive variable is less than 0.01, whereas the significance level for the constant is less than 0.05.

Table VI.4
Summary of the multiple regression model

<table>
<thead>
<tr>
<th>Model</th>
<th>Correlation coefficient (R)</th>
<th>Coefficient of determination ($R^2$)</th>
<th>Adjusted $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.843</td>
<td>0.710</td>
<td>0.693</td>
</tr>
</tbody>
</table>

Table VI.5
Summary of regression coefficients of multiple regression analysis

<table>
<thead>
<tr>
<th>Model 1</th>
<th>B</th>
<th>Std. Error</th>
<th>Standard Coefficient</th>
<th>t</th>
<th>Sig.</th>
<th>Collinearity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-117.34</td>
<td>45.45</td>
<td>-2.582</td>
<td>0.019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score of rules</td>
<td>8.007</td>
<td>1.24</td>
<td>0.843</td>
<td>6.452</td>
<td>0.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

The other three variables (organizational structure, adaptive ability and market position) were excluded because they did not change $R^2$ enough to be statistically significant (Table VI.6).

Table VI.6
Summary of the excluded variables from stepwise regression

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Beta ln</th>
<th>T</th>
<th>Sig.</th>
<th>Partial correlation</th>
<th>Collinearity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational structure</td>
<td>0.003</td>
<td>0.009</td>
<td>0.993</td>
<td>0.002</td>
<td>0.212</td>
</tr>
<tr>
<td>Adaptive ability</td>
<td>0.118</td>
<td>0.299</td>
<td>0.769</td>
<td>0.075</td>
<td>0.116</td>
</tr>
<tr>
<td>Market position</td>
<td>-0.183</td>
<td>-0.440</td>
<td>0.666</td>
<td>-0.109</td>
<td>0.104</td>
</tr>
</tbody>
</table>

The values for the standardized regression coefficients are shown in the column labeled 'Beta ln'. The $t$ statistic for testing that the coefficients are 0 and their observed significance level, are shown in the columns $t$ and Sig. The levels of significance for the excluded variables are too small, indicating that there is a high probability for those coefficients to be similar to 0. The partial correlation coefficients show a very small absolute value, indicating that these variables have almost no information to contribute to the model or equation. Finally, in the 'collinearity statistics' column,
the 'tolerance' is the smallest tolerance for any independent variable in the model, that is, the model will not enter a variable if it results in a very small tolerance for any independent variable.

Tolerance measures the strength of linear relationships among independent variables. For each independent variable, the tolerance is the proportion of variability of that variable that is not explained by its linear relationship with the other independent variables in the model. Thus, a value close to 1 indicates that an independent variable's variability is almost not explained by the other independent variables, as is the case of score of rules, which tolerance is rounded to 1. On the other hand, a value close to 0 indicates that a variable is almost a linear combination of the other independent variables (see tolerance values for the other independent variables in Table VI.6). These variables are called multi-collinear.

SPSS has default values for tolerance (minimum tolerance) that protect against the inclusion of multi-collinear independent variables. Independent variables that are very highly correlated with independent variables already in the equation are not entered. Check in Table VI.1 that correlations between score of rules and organizational structure, market position and adaptive ability are higher than 0.90. Statistically, the three latter variables may inflate the regression coefficients, and logically they are not needed because of their correlation with scores of rules (see Tabachnick and Fidell, 1996).

The equation to predict performance of cooperatives in terms of average catch is then defined by the following formula:

\[ P = SR \times (8.0) - 117.34 \]

Where \( P \) = performance expressed as average catch, and \( SR \) = score of operational rules for each cooperative. I obtained exactly the same equation using a backward multiple regression. I also used a standard regression including all independent variables. Although \( R^2 \) increased to 0.77 (independent variables explain 77% of the variability of performance), the tolerance values were close to 0, indicating a strong collinearity between variables. These results show that operational rules seem to be the most influential variable on the performance of cooperatives in this study.

VI.4 DISCUSSION

To answer the research questions in this chapter, Table VI.2 shows that there is a general tendency of high scores of rules, adaptive ability and market position to be associated with higher satisfaction and average catch. This is especially true for participatory cooperatives, although stated satisfaction of members was not the highest. The other democratic cooperatives, the consultative ones, are the next most productive, but their market position and ability to adapt are less developed. Supervisory cooperatives are an interesting case of recently adapted organizations that respond more effectively to their particular external environment. This condition has improved their market position, that is, they have enough autonomy to sell their catches to the buyer and at prices most convenient for them. Yet, their production is not as high as in democratic cooperatives. A possible explanation is that membership and, consequently, fishing effort is smaller than in supervisory cooperatives.

A similar association among variables is evident for their lower values, that is, low scores of rules, market position and adaptive ability are associated to low satisfaction and average catch. Non-directive, autocratic and laissez-aller cooperatives share these low values, being the less organized, with the weakest market position, less able to adapt to the external environment, and consequently, are the less productive among the cooperatives in Yucatan.
In light of these results, it is possible to say that the three independent variables are correlated to the performance of the cooperatives. However, the results from the multi-variate statistical analyses show that the most influential independent variable is the score of operational rules. At the same time, there does not seem to be a statistically significant influence of the market and adaptation on performance. However, I am certain, because of my working experience in the study area, that these variables have a significant influence on the way fishing cooperatives perform.

My interpretation of the results obtained here is that the scale of measurement of the variables influences these results. I used an ordinal scale to measure the level of adaptive ability, market position, and satisfaction. In the first two variables, I defined only four categories. This fact concentrated the corresponding dependent variable values for each cooperative in four groups, making it difficult to find a linear association among independent and dependent variables. It makes it especially difficult to use multiple regression analysis to yield a linear relationship among variables, and it poses problems of lack of normality of data and collinearity among variables.

Ordinal data are the most frequent, and sometimes the only reliable information available in non-experimental research. The ordering of cases, although lacking a unit of measurement, permits a comparison of cases to identify which one is less or lower than the other(s) (Hildebrand et al., 1977). In this study, the scale I devised defines, for instance, that supervisory cooperatives are more able to adapt than consultative cooperatives, but it does not say how much more able. To know how much, it is necessary to develop an interval or ratio scale of measurement.

I used an ordinal scale of measurement because no other type of information was available to build another scale to measure market position and adaptive ability. In addition, for coding interview data, I felt that a small number of ordered categories were enough to describe the differences among cooperatives. I also believed that ordering the cooperatives in a qualitative way was enough and that numerical values were not important. However, I recognize that it is useful to assign numerical values to different states of an ordinal variable, although these numbers are only to indicate the rank of the variable state in the ordering, without any other significance.

In the case of collinearity among the independent variables, it is because all of the cooperatives have the same values for market position and adaptive ability. It would have been more convenient to develop a ratio scale of measurement by getting economic information in the case of market position and designing another scoring system to measure the factors that determine the ability of cooperatives to adapt. In both cases, as I mentioned, I had to make the analysis with the only information available.

Cluster analysis and MDS complement each other since the groups of cooperatives in the first analysis and the 'neighborhoods' in the second analysis group the cooperatives in a very similar way. In both cases, most productive cooperatives (participatory) are grouped together in a cluster or neighborhood, which the highest similarity measures. Next, less productive but still with large score of rules are the consultative and supervisory cooperatives. Both analyses group together the least productive cooperatives as a separate cluster or neighborhood. In this way, cluster analysis and MDS seem to confirm the results from the multiple regression analysis in terms of considering the scores of rules as the most important factor underlying the grouping of the cooperatives.

Nevertheless, I still strongly believe that the number of rules reflects the organizational level of a cooperative, and that a higher organizational structure facilitates the necessary ability of the cooperative to respond effectively to changes occurring in the surroundings, either social, economic, political, technological or biophysical. Amidst this multi-factorial external environment, the
cooperative with a well structured organization is more likely to have more autonomy in developing more reciprocal exchange relationship with other market agents (intermediaries). Autonomy also means freedom to design and implement new rules or to modify traditional ones in order to maintain and expand the cooperative's operations, by either increasing or diversifying its production.
CHAPTER VII

GENERAL CONCLUSIONS

In this chapter, I advance a number of conclusions from the preceding chapters regarding the influence of the operational rules, adaptive ability and market position on the performance of cooperative organizations. I also discuss the implications of such influence on fisheries management. Then, I discuss which of my results may be considered as contribution to the theories used in my analysis, emphasizing potential new approaches for the study of this type of organization.

I found a general positive correlation between number of rules implemented by the cooperatives, their adaptive ability, their market strategies, and their performance. Besides the statistical evidence, I drew the following conclusions incorporating my previous knowledge of the study area.

VII.1.1 Operational rules, organizational structures and performance

The operational rules implemented by the cooperatives define their organizational design, which in turn influences their performance. This cause-effect relation is established as follows. Clearly defined and well-understood operational rules and organizational structures allow major participation of all cooperatives' members. Several benefits may arise from increased participation. The first one is consistent agreement on proposals reached by the majority. The next one is commitment to the decision reached (see Fisher, 1974), expressed either by compliance or internalization. Compliance refers to the fact that a person follows the rest of the group without being convinced by the decision made by the group. Several fishermen mentioned that sometimes they agreed with regulations because of loyalty to the group, not because they were convinced that that was the best choice. On the other hand, internalization means that a person is convinced that the group has adopted the best solution. Members internalize when the decision reflects their initial position or the fact that they have been convinced by other members' arguments (see Brigham, 1986, on compliance and internalization).

Increased participation of all members also expands the legitimacy of the agreements. If members feel that decision-making takes into account their inputs, they may increase their commitment to respect and comply with resulting agreements more readily. As a concurrent consequence, communication improves because all members know the problems the cooperative is facing and because they can express their concerns. Communication facilitates the transit of ideas, which, if done properly, can improve understanding and may result in the generation of innovative alternatives for decision-makers.

Viewing organizations as networks of information processing units, where decision-making is determined by the organization's communication structure, has been studied by Visser (2000). This author found out that a hierarchy tends to perform better (make better decisions) in tough environments, and that a polyarchy makes better decisions in friendly environments. Borrowing his terminology, authoritative cooperatives may be seen as hierarchies where the top level of the organization makes final decisions, and the tough environment is characterized by highly competitive rival organizations, as it occurs in the community where these cooperatives are located. On the contrary, polyarchies would be represented by democratic cooperatives where decisions are reached by majority, and their environment is friendly in terms that if they do not undertake an action, it is not undertaken by rival cooperatives because they are the only social organizations in their communities or because other cooperatives cannot take either such action. The communication structure of authoritative cooperatives makes it unnecessary for all members to be informed in order to make
decisions, whereas in democratic cooperatives it is essential that all members are informed before making a collective decision.

Participation of all members also simplifies the delegation of authority to councils and committees. Members in these working units are committed to accept responsibility for performing specific tasks and to be accountable for their actions. To delegate authority in an efficient way, lines of authority must be well defined and understood. There is an authority ranking inside any cooperative and each level has specific responsibilities to the next higher rank. When authority hierarchies are clear to everyone, the delegation of authority is more efficient because everybody knows what to do and what is expected from them. In participatory cooperatives, all members participate in the definition of objectives and strategies, so they are certain about what the cooperative is after. Hence, fishermen will devote their efforts and energy to the achievement of such objectives by following the defined strategies. The resulting overall structure increases performance when it links to the cooperatives’ goals. It is also true that the structure, when it becomes too rigid, decreases success if it prevents the cooperative from perceiving more efficient ways of production and organization. Democratic control is less evident in consultative and supervisory cooperatives, so do patterns of participation. Since consultative cooperatives have a similar structure to participatory ones, it would be easier to increase their level of participation by promoting solidarity and democratic control.

VII.1.2 Adaptive ability and performance

Cooperative organizations design different structures to operationalize their mediating role between their members and larger systems such as communities, the market or the government (see Van Wart, 1998). Thus, cooperatives may adapt to create a segmented organizational structure to protect technical activities, such as fishing, as it happens in autocratic and non-directive cooperatives. Or to create an organic structure to adapt successfully to the environment, like in supervisory groups (see Hougland and Shepard, 1980). The design of cooperatives’ organizational structure in Yucatan has had mixed results since some structures are comparatively more efficient for adaptation than others. According to the survey’s results, all cooperatives are associations of persons united voluntarily, for which the main purpose is to meet at least economic needs, plus cultural and social ones. However, devising an ‘autonomy continuum’, I can accommodate the cooperatives from the least to the most autonomous as follows: laissez-aller, autocratic, non-directive, consultative, participatory, and supervisory. None of the first five ones is completely autonomous from other market agents, and all of the six depend on government agencies at least to be legally recognized and to have a fishing permit.

There is an empirical relationship between the level of autonomy and the ability to adapt. The more independent an organization is, the more adaptability it has. There are several types of structural adjustments induced by the environment. For example, laissez-aller cooperatives have no autonomy and they have to adjust totally to the intermediaries’ demands, concentrating their fishing effort only on one or two species despite the fact that other cooperatives catch at least six other valuable species in the same fishing area. These cooperatives exist only in the official records, since their members never carry out any collective action; they have no assets, no liability, and they fish and sell their catches independently from each other. In a similar way, non-directive cooperatives, having a more structured organization than laissez-aller, respond to a similar extra-organizational element to determine what species to catch. In both types of cooperatives, satisfying the demand for particular species makes it unnecessary for these cooperatives to make any further adaptation to survive.

At the same time, other cooperatives strictly respect more intra-organizational and community norms, seeking to counterbalance hindering market and legal influence. For instance, consultative and participatory cooperatives strongly comply with traditional arrangements emerged from long-lasting
local patterns of personal interaction. In these democratic cooperatives, the influence from the
decision unit to adjust varies and gives them more autonomy from the external environment.
Consultative cooperatives are more influenced by the environment than participatory ones. In the
latter, the members have more voice in determining the development of the whole group, and their
inputs are considered during the adjustment process. This situation allows the cooperative to resist
environmental influence. Participatory cooperatives are those in which ownership is on a mutual basis
and decisions are reached by consensus more often. This fact has strengthened them since are among
the most productive cooperatives in the state.

Regarding authoritative cooperatives, the leaders have substantial influence to adjust their cooperatives
in the way it is required. The difference between autocratic and supervisory cooperatives is that in the
former the centralized control in decision-making led leaders' personal interests to overcome collective
interests. As these leaders are financially dependent on intermediaries, their cooperatives lose
independence to adjust. On the contrary, supervisory cooperatives regard their collective objectives as
more important than leader's personal goals although he has substantial influence in adjusting the
cooperative to disruptions. This factor increases their adaptive ability. Supervisory cooperatives are
located in the fishing community where most of the stronger fishing companies are located as well.
One of the most remarkable realizations of these cooperatives is the necessity of being an organized
enterprise operating in the market. This recognition was the starting point to adapt their structure to
control the production, processing, packing, distribution and export of fish products from
the beginning of the 1990s.

VII.1.3 Intermediaries and performance

Among the external environmental conditions that constrain cooperatives' performance, one of the
most important is the role of local intermediaries: The over-exploitation of a small number of species
and the under exploitation of many others is the result of the specialization in the catch composition
demanded by the intermediaries in Yucatan. Intermediaries have previous compromises with the
international market, and these compromises translate into an irrational demand on local resources
from extra-regional economic agents. That is, fish resources do not satisfy local needs and the lack of
diversification applies not only in the catch but also in the way fish-based products are processed. The
major demand is for fresh raw material with minimum processing, impeding added value and hence
economic benefit to the fishermen. Fishes are reduced to fillets and lobsters to 'tails', assigning zero
added value to the rest of the organisms' body.

One of the most important conclusions of this study is that most of the cooperatives lack autonomy to
various degrees. Their financial dependency on intermediaries has determined the catch composition,
their investment policies and capital accumulation patterns. The intermediaries' influence has
expanded to non-related fishing activities, such as personal and familial issues, adding moral obligation
to financial dependency. The intermediaries assure loyalty of fishermen and the supply of valuable raw
material at low prices. The dependency has made cooperatives miss opportunities to enter new, more
profitable markets, to seek technological innovation, and to diversify and expand their production.

VII.2 IMPACTS OF THE FACTORS AFFECTING COOPERATIVES' PERFORMANCE
TO FISHERIES MANAGEMENT

The general objectives of fisheries management are optimizing the biological and economic yield,
maintaining a particular level of population level, protecting the marine and coastal environments, and
providing various social and economic benefits to the fishing communities (King, 1995).
However, some of these objectives have been incompletely satisfied when considering fishing cooperatives in Yucatan. Instead of optimization of biological yield, there are a few overexploited species, whereas many others are under exploited and they could potentially increase the provision of food for local people and other fish-based products for exportation. Most cooperatives concentrate between 80% and 90% of their catches on two or three species. Extreme cases are represented by cooperatives exclusively catching one species. Besides the disparities of biological yield by specific resources, overexploitation of few species may necessarily affect the composition and structure of the marine communities. When overexploitation decreases the population number of few species, the natural balance of marine communities may be altered in unpredictable ways, especially because predation and competition relationships among species have insufficiently been studied in the Yucatan. Under these conditions, it is hard to say if the objective of maintaining particular levels of fish populations has been reached.

Along the same line, it is also hard to estimate whether optimization of economic yield has been reached. Arguing ‘business strategy’, private enterprises have never been willing to disclose their total investment in fisheries. The general perception is that fisheries are overcapitalized, but under current conditions it is not possible to assess by how much. In this context, cooperatives have contributed a very small percentage to the overall economic rent of the Yucatan fishing resources. The contribution of cooperatives has been, on average from 1993 to 1997, about 10% of the total landed value (SEMARNAP, 1998). At the fishermen level, economic information is not available from cooperatives. Based on information provided by fishermen in countless informal conversations and media reports, the common statement is that the capture per fishing effort has constantly been diminishing since the beginning of the 1960s when commercial orientation of the fisheries intensified. At the same time, production costs have been steadily increasing, but catch prices have increased only slightly. As a result, net incomes have been dropping, hence diminishing the economic rent of the fishery, at least for cooperatives’ members.

Regarding protection of resources and environment, participatory and supervisory cooperatives, the ones with higher adaptability to the changing environment, have proposed several measures to support the protection of marine resources. Among these measures are the implementation of a marine protected area and the extension of closed seasons for some species in identified nursing areas. Surveillance on members’ behavior is a regular practice among these cooperatives. Unfortunately, less than one third of the cooperatives analyzed have adopted these protective measures. Simultaneously, other cooperatives have been unwilling or incapable to adapt to more successful and compromised organizations. The idea of cooperatives as an ideal vehicle to deliver fishing policies (Baticados, 1998) is not fulfilled by laissez-aller, autocratic, and non-directive cooperatives, since these lack respect for closed seasons, minimum legal size, legal fishing gear, and fishing reports.

Economic and social benefits for the communities are minimal since many cooperatives’ objectives are concentrated on the economic benefit of their members. This situation results in part from the imposition of formal, rigid and homogeneous structures for the delivery and implementation of fisheries development programs. Problems include loss of traditional knowledge accumulated through generations by fishermen, loss of innovative management practices since the decision-making is centralized, controlled and bounded by governmental agencies, reduction or loss of stability of resource utilization, and loss of economic benefits to the community (see Dyer and Leard, 1994). There are, however, some benefits to complementing traditional and official schemes. For instance, some traditional practices have ‘conservative’ effects, whereas formal regulations may prevent the continuation of ‘bad’ traditional practices, such the lack of strict enforcement of regulations. Therefore, if implemented correctly, both types of regulations have the potential for generating more
sustainable production than the government or the community would generate individually (Dyer and Leard, 1994).

At the onset of the cooperative sector, the government promoted, among their members, collective action, diversification of the catch composition, and the satisfaction of social concerns in their communities. However, because of the lack of managerial skills and freedom for market exchange, cooperatives entered dependence power relations holding subordinated positions. Consequently, the general behavior of fishermen has been shifting towards individualization in their personal interaction, specialization of fishing in a small number of species, and maximization of profit to pay financial debts. Due to their financial dependency, paying the loans to the intermediaries has become one of the most important priorities to fishermen. The dependency is so strong that they have no saving capabilities, hence having to fish practically every day to have capital to support their families. Ignoring this reality has reduced the impact of fishing policy objectives. For instance, training goals have often not been achieved due to low attendance by fishermen because they have no savings to stop fishing for one single day.

VII.2.1 Position of cooperatives vis-à-vis intermediaries and the government

The autonomy of action of local fishing firms as intermediaries also has an effect on the way cooperatives comply with fishing regulations. Intermediaries main market strategy is collusion for pricing and keeping other buyers from entering the local market. Their organization makes a remarkable contrast to the lack of coordination between municipal, state and federal agencies. Whereas the federal Ministry of Natural Resources, Environment and Fisheries has been reducing and even canceling the issuing of fishing permits to reduce the fishing effort, the state Ministry of Industrial Development has promoted the operation of more high-technology processing and packing facilities. The rational conclusion of fishermen is that if there are new fishing plants, there is still someone who will buy their catches; thus, new and traditional fishermen will maintain or even increase the fishing pressure over targeted marine resources.

Bureaucratically designed fishery management policies are centralized and traditionally their implementation is 'top-down', without considering local characteristics of resources and users. Policy-makers, and consequently policies, have a simplistic image of fishermen because they expect fishermen to react automatically to the official regulations, without considering social, economic and cultural conditions of cooperatives, their members and communities. Moreover, fishermen are the simplistic representation of resource depletion. Policy-makers have blamed fishermen countless times for the decrease in biological yield. However, there is not explicit recognition of the irrational definition of the demand made by the market, and consequently, the government has not proposed measures to reduce the impact of such demand.

Contradictory laws worsen this situation, so does the fact that often field officers and administrative personnel in official agencies do not understand these laws. As an illustrative example, the General Law of Cooperative Organizations was enforced by the Ministry of Employment and the Ministry of Natural Resources, sometimes in a discretionary way, creating too much confusion for fishermen and delaying the permission for operating a new cooperative by up to a year.

The lack of coordination among agencies, their lack of qualified personnel, and the misunderstanding and misapplication of the fishing law among field officers and fishermen cause inefficient and unfair enforcement. It is inefficient because it does not properly address the set of market incentives that induce non-compliance (the financial dependence of cooperatives and their lack of freedom to engage in equitable market exchange). Enforcement is unfair as well because it targets mostly low-income
fishermen, but simultaneously facilitates the intermediaries to trade practically any marine resource. In view of the insufficient number of field inspectors, it seems to be more efficient to exert surveillance on the fishing firms because most of the catch are concentrated at the end (see Sutinen et al., 1990).

If the government agencies do not effectively assume their regulatory role and allow the emergence and continuance of oligopsonistic practices; if they do not enforce evenly and fairly the fishing regulations, and if they do not recognize the economic, social, and cultural motivation of the cooperatives, it is more likely that the participation of intermediaries will continue to determine the subordinated market position of the cooperatives, impeding their integral development as economic and social agents.

VII.3 CONTRIBUTIONS TO THEORY
It is expected that this study will stimulate further discussion on cooperatives by comparing their structure and decision-making processes. More precisely, it will be an empirical contribution to the adaptive and interpretative models of decision-making (Chaffee, 1984). The adaptive model interprets the organization as an entity with its own goals and coherent, goal-oriented actions. Democratic and supervisory cooperatives fit more in this model to a varying degree, with the supervisory ones at the extreme of adapting themselves to changes in the environment to maintain or increase the flow of resources into the cooperatives. Permissive and autocratic cooperatives fit more in the interpretative model. It portrays the organization as a network of participants who use their association to pursue their individual goals, with the laissez-aller cooperatives at the extreme of comprising a network of highly self-interested members.

VII.3.1 The measurement of success
In Chapter I, I introduced in the idea that success, as an expression of performance, is the achievement of objectives. The only objectives that were explicitly recognized and used to measure the performance of the cooperatives were satisfaction and production (average catch). These two represent indirect and direct indicators and methods for measuring the achievement of objectives by cooperatives. The indirect or person-related approach is useful and necessary to measure imprecise, non-operational elements from a set of objectives. The direct or performance-related methods of success measurement, are used to determine an objective achievement of objectives (Blumle, 1985). It is important for studies on cooperatives to define from the beginning how performance is going to be measured, because it affects the kind of information needed and the methodology used to collect such information. Besides, depending on the approach, cooperatives may be successful or not. Thus, it is recommended to integrate both methods of measurement to support a comprehensive evaluation of success.

The basic difference between direct and indirect indicators is that they measure operational and non-operational elements of the system of objectives. Indirect indicators are helpful in cases where members of cooperatives are not aware, most of the time, of operational elements, such as profitability, sales or costs. I found that most of the members in Yucatan cooperatives are concerned with non-operational elements, such as attitude to the cooperative, willingness to participate in the settlement of conflicts, and agreement about the principles of management.

In this study, I used satisfaction as an indirect measure of success. The measurement is based on evaluating the subjectively perceived fulfillment of objectives by cooperative members. Satisfaction was ascertained by directly asking fishermen to express their level of subjectively perceived objective's achievement through their opinion on the general administration of their cooperatives. At the same time, within this indirect measurement of success, there are indirect indicators as well. I evaluated
these by observing the behavior of members as members (willingness to participate in assemblies and get involved in the management of the cooperative), and as clients (using the basic cooperative's services). I used observation of behavior to confirm stated satisfaction of members of different cooperatives.

The most useful direct indicators of success are those that show the achievement directly, as profit, market share, and turnover. In this study, the direct indicator of success is the average catch per cooperative. Other indicators that provide indirect information on objective's achievement are adaptability and market position, although I used them as independent variables measured with categorical scales.

The system or set of objectives I have been referring to includes those stated in the cooperative's chart and those expressed by the members during the interviews. The general objectives that the cooperatives should aim for are:

a) Ensure the preservation or survival of the cooperative. This means that the cooperative should be able to preserve and increase its assets in the long-term. For this, they need to maintain or increase their level of income or profitability.

b) Increase profitability, which means increase productivity and competitiveness in the market and, at the same time, reduce costs of production through economies of scale.

c) Provide services tailored to the members' needs. The cooperative must offer services to members so they can meet their economic, social and cultural aspirations.

It seems that the use of one direct and one indirect method/indicator to measure performance of Yucatan cooperatives is adequate to make a comprehensive assessment of their performance.

VII.3.2 On the organizational framework

The major hurdle seems to be the problem of building a suitable organizational framework, which is viable and dependable in the face of the competitive environment. This problem stems largely from the very nature of the cooperative organization. As a business organization, it should attain operational efficiency like any other private enterprise. As a social organization, it has to be designed to function for the social and economic improvement of its members.

In the case of Yucatan cooperatives, those with a supervisory organizational structure have oriented their management to increase their competence in running the cooperative as an economically viable unit. Leaders had understood the economies of scale of cooperation and had been able to exploit the opportunities in the environment for the development of the members and the cooperatives. For example, they are the only leaders that have adopted the new official regulation that allows them to be up to five years on the board of directors. There is also the possibility of reelection. Supervisory cooperatives have been able to adapt their structure to face greater challenges from the market environment. Their new structure has been built up to meet the emerging needs, and can be thought of as a hybrid structure that seeks to mix a business culture with democratic values. One important consideration is that growth and diversification of the range of activities to be competitive is closely linked to risk-prone, systematic thinking, motivated leaders (see Seetharaman and Mohanan, 1985).

In the case of participatory, consultative, and non-directive cooperatives, the board of directors keeps a constant interaction with the members. This interaction is favored by the rotation in managerial functions, that is, the board of directors and committees change every three years. Although this fact
increases interaction between management and members, and enhances awareness of organizational and individual goals, it hinders management because members gaining experience and knowledge at the board level have to leave their position to other members that may not have any experience in management. Participatory, consultative, and non-directive cooperatives kept more attached to the cooperative development policy of the state. The policy created a single structure and forced cooperatives to adopt it (institutional isomorphism). The state offered cheap credits, privileges in the distribution of the catches, exclusive rights to exploit scarce, valuable species, managerial subsidy, and asked cooperatives for shared capital participation, recognition of the members' general meeting as the supreme body of the cooperative, and majority rules for participatory decision-making.

The original stated purpose of the cooperative development policy was to implement governmental social and economic programs. However, the evolution of these cooperatives shows that only participatory groups have continued with the original structure and an increased level of participation and democratic control of their operations. Democratic practices and participatory patterns of members' behavior are less apparent in consultative cooperatives. In the case of non-directive cooperatives, their operations mostly help a few leaders who take the benefits that accrue from the cooperatives (autocratic leaders have taken this situation to its extreme expression). Most of the members seldom participate in a democratic decision-making process, and the cooperatives have become a mere instrument in the hands of the intermediaries.

VII.3.3 On theoretical frameworks

These contrasting differences between supervisory and democratic cooperatives make it difficult to define a suitable strategy in the search for the right type of cooperative organizational framework. The search may be an elusive task if concern focuses only on finding the right type of organizational structure. It is probably more promising in the short term to use as many suitable perspectives from organization theory as needed to explain the reality of the cooperatives in Yucatan. With these perspectives, more knowledge may be generated though further studies and one may then develop a more suitable framework for the analysis of cooperatives.

Therefore, there is a need for considerable theoretical development and experimentation for identifying alternative types of organizations to properly analyze cooperatives. The mainstream of organization theory has generated paradigms and hypothesis for other organizational forms, mainly big corporations and official sectors (Stryjan, 1989). It has been hard to prove the democratic nature of cooperatives due to the strong influence of the 'Iron Law of Oligarchy' (Michels, 1915 in May, 1985), which points out that even organizations with the highest commitment for democracy end up controlled by a few members. Also most of the cooperatives in Mexico had followed, through institutional isomorphism, the Weber's bureaucratic model, which emphasizes rational decision-making, job appointment by merit, reliance upon written rules, and graded hierarchies. The model has been dominant in part because cooperatives have made almost no attempt to create innovative organizational designs for more membership involvement and control.

My standpoint is that self-managed organizations need special designs to conduct in different ways, apart from 'classical' organizations. At the same time, researchers may develop a new theory that may enrich current organization theory. Therefore, a theory of cooperatives and other self-managed organizations should proceed from organizational practice to theory. The starting point is to recognize that established organizational theory cannot entirely explain cooperatives. For instance, to my knowledge, there is no approach that can explain the unique characteristic of cooperatives consisting of all members at the top, administrative and operational levels sharing the supreme authority for strategic decision-making. Also, it is necessary to acknowledge that is rather impossible to find a unitary model of organizational design to describe all types of cooperatives' structure, or to which all
organizations should aim. It is necessary to recognize the complexity of reality and to avoid focusing all research efforts on the philosophical traditions of reification, reductionism, and hierarchization. The propensity to convert abstract concepts into hard entities for measurement purposes, the desire to explain random and irreducible complex phenomena by deterministic behavior of small constituent parts, and the inclination to order items by ranking them into a linear series of increasing worth, are useful ways to help explain reality. However, its interpretation should go beyond analytical tools to accommodate theory to reality, not the other way around.

In this study, I have used an eclectic approach in the sense of using as many organizational 'theories' as needed to understand the real situation of cooperative organizations in a rather small region. I used this approach because I identified at least six structural designs that may need different approaches to explain why the cooperatives are performing differently. I think this is precisely the orientation for further research: to find alternative explanations to understand various current organizational structures of a type of organization that theoretically should be homogeneous. Alternative explanations must be directed to the micro (personal), meso (organizational), and macro (external environment) levels to develop a comprehensive understanding of cooperative organizations.
REFERENCES

CHAPTER I


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**CHAPTER II**


**CHAPTER III**


CHAPTER IV


**CHAPTER V**


Hartman, W. D. "Target groups in improving marketing systems for artisanal fisheries: producers or middlemen? The case of Northern Brazil." Conference Internationale sur les Peches., Rimouski, Quebec, Canada, 121-128.


CHAPTER VI


CHAPTER VII


APPENDIX A
Guide questions to interview cooperatives' board of directors.

OPERATIONAL RULES. Rules governing the social relationships within cooperatives

Eligibility. Characteristics to participate or not as member or as manager

1. What are the conditions to be accepted as member of this cooperative?
2. What are the conditions to expel a member?
3. Does a member have any opportunity to appeal when he has been expelled?
   ____ Yes       ____ No
4. If yes, please explain the appealing process

Decision. The formulas used for decision-making in collective actions

5. What are the general assembly duties?
6. How are agreements undertaken within this cooperative?
7. How are the cooperative incomes and costs distributed among the members?
8. How is the annual yield distributed among the members?

Position. What position members may hold within the cooperative.

9. What are the boards and commissions in which members of this cooperative can participate?
10. How long can a member be in the boards? ____ years
11. What are the conditions to keep being member of the committee?

Payoff. The rewards or penalties which may be assigned to actions or outcomes

12. What are the reasons for being member of a cooperative?
13. How is the members' behavior constrained?
14. How is the members' behavior induced?

Authority. The authorized action participants can take independently.
15. What kind of action members can take without approval of the cooperative?

16. In case of independent actions generate problems, is there any conflict-solving mechanism?

17. How is considered the highest authority within the cooperative?

**Information.** The information that participant may reveal to others.

18. How are the agreements informed within the cooperative?

19. What kind of information members must share within the cooperative?

**RELATIONSHIP WITH THE COMMUNITY**

20. What are the existing local property-rights arrangements on fishing resources between the cooperative and the no-member fishers?

21. In which community's special occasions does the cooperative actively participate?

22. What are the linkages between cooperative's managerial staff and local authorities?

23. Are there conflicts in the fishing activity and use of other marine resources between the cooperative and no-member fishers?

24. If yes, what is the nature of the conflicts?

25. How those conflicts are resolved?

**Ecological attitudes**

26. How do members of your cooperative perceive the future of the fishery resources?

27. What are the corresponding attitudes to these perceptions?

28. How is the ecological knowledge passed through generations?

29. What are the different activities that this cooperative carries out and/or participate?

30. What are the relevant factors you consider have driven your cooperative to its current level of organization and production? Please rank and check them as positive (+) or negative (-), being 1 the most important.

31. Why do you consider those factors as being important? Please explain.
32. Have all members of the cooperative discussed these factors to understand its current level of organization and production? Please explain.

33. What other factors do you think should be considered to improve the level of organization and production of your cooperative?

**RELATIONSHIP WITH THE INTERMEDIARIES**

34. What are the arrangements for supplying marine species to the intermediaries?

35. How are the different species priced?

36. How is the price agreement formalized?

37. How is the price agreement enforced?

38. With how many intermediaries this cooperative trades?

39. If more than one, Why? Please explain

40. Where are the intermediaries from?

41. Is there a credit-marketing relationship between cooperative/fishers and intermediaries?

42. If yes, please explain.

43. What is the role of the cooperative when the credit relationship is established directly with its members?
APPENDIX B
Questionnaire for measuring satisfaction among members

First section: cooperative attributes.

In the following questions, circle the number that best expresses your views about each attribute.

Management style.

**Question 1:** How satisfied are you about the general way your cooperative has been managed in the last 6 years?

1. Completely satisfied  
2. Mostly satisfied  
3. Mixed—equally satisfied and dissatisfied  
4. Mostly dissatisfied  
5. Completely dissatisfied

**Question 2:** In a few words, could you explain why are you (dis)satisfied?

**Question 3:** How do you evaluate the performance of your cooperative in the following situations?

<table>
<thead>
<tr>
<th>Situations</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Don’t know</th>
<th>Poor</th>
<th>Very poor</th>
<th>Terrible</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Dealing with fish buyers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>b) Dealing with local authorities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>c) Dealing with federal authorities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>d) Asking for technical assistance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>e) Dealing with finance sources</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>f) Members carrying management</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>g) Managing savings plan</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>h) Applying internal rules</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>i) Solving internal conflicts</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

Solidarity among members.

**Question 4:** How satisfied are you about the solidarity that is perceived in your cooperative?

1. Completely satisfied
2. Mostly satisfied
3. Mixed –equally satisfied and dissatisfied
4. Mostly dissatisfied
5. Completely dissatisfied

**Question 5:** In a few words, could you explain why are you (dis)satisfied?

**Question 6:** How do you evaluate the performance of the members of your cooperative in the following situations?

<table>
<thead>
<tr>
<th>Situations</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Good</th>
<th>Don’t Know</th>
<th>Poor</th>
<th>Very Poor</th>
<th>Terrible</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Compliance with regulations</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>b) Selling catches only to the coop</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>c) Participation in meetings</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>d) Good personal relations</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>e) Following internal rules</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>f) Sharing information on fishing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

**Equipment and facilities.**

**Question 7:** In general, how satisfied are you with your cooperative’s equipment and facilities?

1. Completely satisfied
2. Mostly satisfied
3. Mixed –equally satisfied and dissatisfied
4. Mostly dissatisfied
5. Completely dissatisfied

**Question 8:** In a few words, could you explain why are you (dis)satisfied?

**Question 9:** How do you evaluate the way your cooperative acquire and maintain equipment and facilities?

<table>
<thead>
<tr>
<th>Equipment and facilities</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Good</th>
<th>Don’t know</th>
<th>Poor</th>
<th>Very Poor</th>
<th>Terrible</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Fishing equipment</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>b) Vehicles</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
c) Office furniture 1 2 3 4 5 6 7
d) Buildings 1 2 3 4 5 6 7
e) Fish storage facilities 1 2 3 4 5 6 7
f) Ice making facilities 1 2 3 4 5 6 7
g) Fish processing facilities 1 2 3 4 5 6 7

**Question 10:** How satisfied are you with the access you have to the equipment and facilities provided by your cooperative?

0. Do not apply
1. Completely satisfied
2. Mostly satisfied
3. Mixed —equally satisfied and dissatisfied
4. Mostly dissatisfied
5. Completely dissatisfied

**Question 11:** In a few words, could you explain why are you (dis)satisfied?

**Question 12:** How satisfied are you with the access you have to the technical assistance requested by your cooperative?

0. Do not apply
1. Completely satisfied
2. Mostly satisfied
3. Mixed —equally satisfied and dissatisfied
4. Mostly dissatisfied
5. Completely dissatisfied

**Question 13:** How satisfied are you with the access you have to the financial resources requested by your cooperative?

0. Do not apply
1. Completely satisfied
2. Mostly satisfied
3. Mixed —equally satisfied and dissatisfied
4. Mostly dissatisfied
5. Completely dissatisfied

Second section: social and fishing services.
In the following questions, circle the number that best expresses your views about each attribute.

**Social services.**

**Question 14:** In general, how satisfied are you with the social services (medical services, water supply) provided by your community?

1. Completely satisfied
2. Mostly satisfied
3. Mixed —equally satisfied and dissatisfied
4. Mostly dissatisfied
5. Completely dissatisfied

**Question 15:** In a few words, could you explain why are you (dis)satisfied?

**Question 16:** How do you evaluate the provision of the following services by your community?

<table>
<thead>
<tr>
<th>Social services</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Don’t apply</th>
<th>Poor</th>
<th>Very poor</th>
<th>Terrible</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Access roads</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>b) Postal service</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>c) Telephone service</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>d) TV, radio, newspapers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>e) Electricity supply</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>f) Water supply</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>g) Medical services</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>h) Food markets</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>i) Schools</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

**Fishing services.**

**Question 17:** In general, how satisfied are you with the fishing services (dry dock, lighthouse) provided by your community?

1. Completely satisfied
2. Mostly satisfied
3. Mixed —equally satisfied and dissatisfied
4. Mostly dissatisfied
5. Completely dissatisfied

**Question 18:** In a few words, could you explain why are you (dis)satisfied?
**Question 19:** How do you evaluate the provision of the following services by your community?

<table>
<thead>
<tr>
<th>Fishing services</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Don't apply</th>
<th>Poor</th>
<th>Very poor</th>
<th>Terrible</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Dry docks</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>b) Lighthouse</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>c) Ice making facilities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>d) Gasoline and oil supply</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>e) Gear and equipment supply</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>f) Equipment maintenance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>g) Fish storage facilities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>h) Fish processing facilities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

**Third section: relationship cooperative-community.**

In the following questions, circle the number that best expresses your views about each attribute.

**Question 20:** In general, how satisfied are you with the relationship that your cooperative has established with your community?

0. Do not apply  
1. Completely satisfied  
2. Mostly satisfied  
3. Mixed – equally satisfied and dissatisfied  
4. Mostly dissatisfied  
5. Completely dissatisfied

**Question 21:** In a few words, could you explain why are you (dis)satisfied?

**Question 22:** How do you evaluate the way your cooperative support or sponsor the following events in your community?
**Question 23:** How do you evaluate, in turn, the support your community provides to the following events promoted by your cooperative?

<table>
<thead>
<tr>
<th>Events</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Don't apply</th>
<th>Poor</th>
<th>Very poor</th>
<th>Terrible</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Social</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>b) Cultural</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>c) Religious</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>d) Sport</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>e) Social projects</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

**Fourth section: relationship cooperative-fish buyers.**

In the following questions, circle the number that best expresses your views about each attribute.

**Question 24:** How satisfied do you feel about the relationship your cooperative has established with the main fish buyer(s) that operate in your community?

0. Do not apply  
1. Completely satisfied  
2. Mostly satisfied  
3. Mixed—equally satisfied and dissatisfied  
4. Mostly dissatisfied  
5. Completely dissatisfied

**Question 25:** In a few words, could you explain why are you (dis)satisfied?
**Question 26:** Is the fish buyer(s) behavior fair and consistent regarding the following activities with your cooperative?

<table>
<thead>
<tr>
<th>Activities</th>
<th>Strongly agree</th>
<th>Moderately agree</th>
<th>Mildly agree</th>
<th>Don’t know</th>
<th>Mildly disagree</th>
<th>Moderately disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Fixing prices</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>b) Providing loans</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>c) Enforcing contract</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>d) Determining demand</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>e) Sharing market information</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>f) Buying legal catches</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

**Question 27:** How do you evaluate, in turn, your cooperative’s performance regarding the following activities with the fish buyer(s)?

<table>
<thead>
<tr>
<th>Activities</th>
<th>Strongly agree</th>
<th>Moderately agree</th>
<th>Mildly agree</th>
<th>Don’t know</th>
<th>Mildly disagree</th>
<th>Moderately disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Fixing prices</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>b) Asking for loans</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>c) Enforcing contract</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>d) Determining supply</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>e) Asking for market information</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>f) Selling legal catches</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
# APPENDIX C

## Operational rules counting system

<table>
<thead>
<tr>
<th>Operational rules</th>
<th>Question</th>
<th>Answers</th>
<th>Counting system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligibility</td>
<td>Conditions to be member</td>
<td>Permanent resident&lt;br&gt;Be relative of a member&lt;br&gt;Be an experienced fisher&lt;br&gt;Be a morally respected fisher&lt;br&gt;Have own equipment&lt;br&gt;Pass a test period</td>
<td>One point per condition</td>
</tr>
<tr>
<td>Characteristics to be, or stop being member</td>
<td>Conditions to be expelled</td>
<td>No compliance with regulations&lt;br&gt;No compliance with internal rules&lt;br&gt;No compliance with agreements&lt;br&gt;No selling his catch to the coop</td>
<td>One point per condition</td>
</tr>
<tr>
<td>Possibility to appeal</td>
<td></td>
<td>Yes or no</td>
<td>Yes = 1 No = 0</td>
</tr>
<tr>
<td>Appealing process</td>
<td></td>
<td>No process&lt;br&gt;During ordinary assembly&lt;br&gt;Before a committee&lt;br&gt;Selecting 3 defendants</td>
<td>0 points&lt;br&gt;1 point&lt;br&gt;2 points&lt;br&gt;3 points</td>
</tr>
<tr>
<td>Decision</td>
<td>Decisions made by general assembly</td>
<td>Approve members’ entry/exit&lt;br&gt;Approve operational rules modifications&lt;br&gt;Approve production plan&lt;br&gt;Approve profits distribution&lt;br&gt;Approve committee’s reports&lt;br&gt;Approve candidates for committees&lt;br&gt;Approve sanctions to members&lt;br&gt;Approve ecological measures</td>
<td>One point per condition</td>
</tr>
<tr>
<td>Mechanisms used for collective decision-making</td>
<td>How decision are undertaken</td>
<td>Unanimity&lt;br&gt;Majority rule&lt;br&gt;Nominal</td>
<td>1 point&lt;br&gt;2 points&lt;br&gt;3 points</td>
</tr>
<tr>
<td>Costs and benefits distribution</td>
<td></td>
<td>According to the catches&lt;br&gt;According to the quality of the job</td>
<td>1 point&lt;br&gt;2 points</td>
</tr>
<tr>
<td>Annual economic surplus distribution</td>
<td></td>
<td>There is no distribution&lt;br&gt;According to the catches&lt;br&gt;According to the quality of the job&lt;br&gt;According to the time as member</td>
<td>0 points&lt;br&gt;1 point&lt;br&gt;2 points&lt;br&gt;3 points</td>
</tr>
<tr>
<td>Position</td>
<td>How many committees the coops has</td>
<td>Administration</td>
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<td>----------</td>
<td>----------------------------------</td>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vigilance</td>
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<tr>
<td></td>
<td></td>
<td>Technical control</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Education</td>
<td></td>
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<td></td>
<td></td>
<td>Social security</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conciliation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How many time to be in a committee</td>
<td>Two years</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Five years</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider reelection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conditions to be in a committee</td>
<td>Be member of the coop</td>
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<tr>
<td></td>
<td></td>
<td>Be literate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Be of certain age</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Be permanent resident</td>
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<tr>
<td>Payoff</td>
<td>Reasons to be member</td>
<td>Reach goals collectively</td>
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<td></td>
<td></td>
<td>Reach social prestige</td>
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<td></td>
<td></td>
<td>Have access to valuable species</td>
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<td></td>
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<td>Increase solidarity</td>
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</tr>
<tr>
<td></td>
<td>Inducements and sanctions</td>
<td>Economic sanctions</td>
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<tr>
<td></td>
<td>applied to members</td>
<td>Member is expelled</td>
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</tr>
<tr>
<td></td>
<td>How members behavior is controlled</td>
<td>No inducement</td>
<td></td>
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<td></td>
<td></td>
<td>Economic rewards</td>
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<td></td>
<td></td>
<td>Promotion to positions</td>
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<td></td>
<td>How members behavior is induced</td>
<td>What species to target</td>
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<td>Authority</td>
<td>Actions without authorization</td>
<td>What equipment to use</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td>What fishing areas to go</td>
<td></td>
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<td></td>
<td>Members’ actions that can be done independently</td>
<td>What amount of fish to catch</td>
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<td></td>
<td>Solving problem mechanisms when an action cause a problem</td>
<td>Ordinary assembly</td>
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<td></td>
<td></td>
<td>Extraordinary assembly</td>
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<td>Especial committee</td>
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<td>Traditional leaders</td>
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<td></td>
<td>Who represent the highest authority</td>
<td>Board of directors</td>
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<td></td>
<td></td>
<td>General assembly</td>
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<p>|          | One point per action              |
|          | One point per condition           |
|          | One point per reason              |
|          | One point per committee           |</p>
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<th>Information</th>
<th>How absent members are informed about agreements undertaken in an assembly</th>
<th>Members have to ask to the board</th>
<th>1 point</th>
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<td>Information that members can share</td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Other members tell them</td>
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<td>What kind of information members have to share</td>
<td>Written information is sent to them</td>
<td>3 points</td>
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<td>What kind of information members have to share</td>
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<td>Productive fishing spots</td>
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<td>Intruders within coop's fishing area</td>
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<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Higher prices offered by buyers</td>
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<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Committees' reports</td>
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<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Coop's financial situation</td>
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<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Anybody can catch local resources</td>
<td>1 point</td>
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<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Any local fisher can catch local species</td>
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<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>No members have to respect coop's concession fishing area</td>
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<td></td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Members have to respect other groups' concession fishing area</td>
<td>4 points</td>
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<td>Relationship with the environment</td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Political</td>
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<td>Cultural</td>
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<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Recreational</td>
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<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Religious</td>
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<td>Scope rules (cont.)</td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>There is no relationship</td>
<td>0 points</td>
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<tr>
<td></td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Coops respect and support local authority</td>
<td>1 point</td>
</tr>
<tr>
<td></td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>There is mutual support and respect</td>
<td>2 points</td>
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<tr>
<td>Relationship with the environment</td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>There is no relationship</td>
<td>0 points</td>
</tr>
<tr>
<td></td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Coops respect and support local authority</td>
<td>1 point</td>
</tr>
<tr>
<td></td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>There is mutual support and respect</td>
<td>2 points</td>
</tr>
<tr>
<td></td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>There is no relationship</td>
<td>0 points</td>
</tr>
<tr>
<td>Relationship with the environment</td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Coops respect and support local authority</td>
<td>1 point</td>
</tr>
<tr>
<td></td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>There is mutual support and respect</td>
<td>2 points</td>
</tr>
<tr>
<td></td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>There is no relationship</td>
<td>0 points</td>
</tr>
<tr>
<td>Relationship with the environment</td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Coops respect and support local authority</td>
<td>1 point</td>
</tr>
<tr>
<td></td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>There is mutual support and respect</td>
<td>2 points</td>
</tr>
<tr>
<td>Relationship with the environment</td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>There is no relationship</td>
<td>0 points</td>
</tr>
<tr>
<td></td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>Coops respect and support local authority</td>
<td>1 point</td>
</tr>
<tr>
<td></td>
<td>How absent members are informed about agreements undertaken in an assembly</td>
<td>There is mutual support and respect</td>
<td>2 points</td>
</tr>
<tr>
<td>Relationship with the environment</td>
<td>How fishing resources are perceived by the coop when designing production plans</td>
<td>Resources are abundant and limitless</td>
<td>0 points</td>
</tr>
<tr>
<td>Relationship with the environment</td>
<td>How fishing resources are perceived by the coop when designing production plans</td>
<td>Resources can resist technological changes</td>
<td>1 point</td>
</tr>
<tr>
<td>Relationship with the environment</td>
<td>How fishing resources are perceived by the coop when designing production plans</td>
<td>Resources can be exploited to a limit</td>
<td>2 points</td>
</tr>
<tr>
<td>Relationship with the fish buyer</td>
<td>Resources are limited and fragile</td>
<td>3 points</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>What are the attitudes regarding these perceptions</td>
<td>Resources open only to entrepreneurs</td>
<td>1 point</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resources can be exploited with new tech</td>
<td>2 points</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Government should set fishing limits</td>
<td>3 points</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resources should be managed with local inputs</td>
<td>4 points</td>
<td></td>
</tr>
<tr>
<td>How ecological knowledge is disseminated</td>
<td>There is no dissemination</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Each member disseminate among his crew</td>
<td>1 point</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Knowledge is incorporated to operational rules</td>
<td>2 points</td>
<td></td>
</tr>
<tr>
<td>What are the arrangements to supply the catches to the buyer</td>
<td>The buyer determines what species and when</td>
<td>1 point</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The coop determines what species and when</td>
<td>2 points</td>
<td></td>
</tr>
<tr>
<td>How prices are fixed</td>
<td>The buyer fix the prices</td>
<td>1 point</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The coop fix the prices</td>
<td>2 points</td>
<td></td>
</tr>
<tr>
<td></td>
<td>There is a negotiation</td>
<td>3 points</td>
<td></td>
</tr>
<tr>
<td>How the negotiation is formalized</td>
<td>“Shaking hands”</td>
<td>1 point</td>
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<tr>
<td></td>
<td>Signing a contract</td>
<td>2 points</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The government adjudicates the negotiation</td>
<td>3 points</td>
<td></td>
</tr>
<tr>
<td>How the negotiation is enforced</td>
<td>The buyer applies economic sanctions</td>
<td>1 point</td>
<td></td>
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<tr>
<td></td>
<td>The coop applies economic sanctions</td>
<td>2 points</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The government enforces the breacher</td>
<td>3 points</td>
<td></td>
</tr>
<tr>
<td>With how many buyers the coop deals</td>
<td>One</td>
<td>1 point</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than one</td>
<td>2 points</td>
<td></td>
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<td>If more than one, what is the reason</td>
<td>Higher prices</td>
<td>1 point</td>
<td></td>
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<tr>
<td></td>
<td>Possibilities of expansion</td>
<td>2 points</td>
<td></td>
</tr>
<tr>
<td>Where are the buyers from</td>
<td>Local market</td>
<td>1 point</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regional market</td>
<td>2 points</td>
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<td></td>
<td>National-international markets</td>
<td>3 points</td>
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<td>Is there a credit relationship</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2 points</td>
<td></td>
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<tr>
<td>If yes, how it does operate</td>
<td>The buyer fix prices and have exclusive right to buy the coop’s catches</td>
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<td>The coop applies economic sanctions if the buyer does not pay according to the agreement</td>
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## APPENDIX D
Catch composition, in percentage, per cooperative

<table>
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<th>COOPERATIVE</th>
<th>Grouper</th>
<th>Octopus</th>
<th>Lobster</th>
<th>Shark</th>
<th>Carito</th>
<th>Chacchi</th>
<th>Red snapper</th>
<th>Corvina</th>
<th>Yellow tail</th>
<th>Porgies</th>
<th>Other sp.</th>
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<td>37</td>
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APPENDIX E
Typical decision situations at different levels of organizational structure of cooperatives

Strategic individual decision-making
There are some differences in the decision-making process described in Chapter III, section III.6.4 when considering authoritative cooperatives. As the leaders make the strategic decisions most of the time, these persons do not need to call for a meeting. Then, when facing a situation decision, they skip the information stage because they control all of it. They may discuss the problem with the general administrator in supervisory cooperatives, or they can decide by themselves in the case of autocratic cooperatives. Once the leader makes the decision, he can delegate the responsibility of implementing a specific action depending on the importance of the problem. The difference between supervisory and autocratic leaders is that the former undertakes a learning process to gain knowledge from the problem solved, and to take preventive actions for avoiding the same or similar problems in the future, whereas the autocratic leader does not embrace this learning process.

The examination of some personal characteristics of supervisory leaders helps the analysis of strategic decision-making in these types of cooperatives. The first characteristic is that these leaders understand when problems are complex and that the solutions may affect the whole organization. They evaluate solutions in how they solve the problem (intended results) and how they affect the whole organization (unintended results). Supervisory leaders are aware that problems and solutions change over time, and that solutions may create new situations that will need a different solution in turn. This characteristic is known as systematic way of thinking (Montana and Charnov, 1993).

Another characteristic is that supervisory leaders sometimes plan in advance with the help of the general administrator, innovative alternatives to achieve strategic objectives. They attempt to deal with problems before they emerge as major difficulties because, as mentioned earlier, it is easier and more efficient to deal with small problems before they grow. If there is need for a change, they try to change in the right direction to survive to the rapidly modifying environment, accepting the associated risk and uncertainty.

Supervisory leaders make decisions in two basic ways. The first way is descriptive or looking at historical analogies to find how other cooperatives have solved either similar or dissimilar problems in the past. The second way is prospective or trying to imagine a future scenario to solve the problem and then acting as needed to enable the desired scenario. They can use either way or a combination of both. Then, they gather information to construct a conceptual model to represent the problem in a manageable way. Next, they try different decision rules to select the best alternative. The best approach they have devised is using informal decision rules. That is, they base their decision on experience and common sense.

Administrative group decision-making
Group decision-making in non-directive and consultative cooperatives is more concerned with administrative decisions. This is because the boards of directors of those cooperatives transfer the strategic decision-making to the intermediary, operating as a technical department of a larger fishing firm. Administrative decisions are more suitable to committees or staff members, and are more concrete and action oriented. An important characteristic of administrative decisions is that they are made with regards to routine problems that lead to systematic procedures that affect specific areas of the cooperative. Because of this, directors making administrative decisions exhibit a more
simplistic way of thinking. Usually, directors assume that each problem has a single solution and that it will affect only the problem area, not the rest of the cooperative. Once the solution is implemented, it remains valid and should only be evaluated on how well it solves the problem. The disadvantage with this way of thinking is that ignoring the interrelationships among organizational levels may lead to a simplistic solution that does not solve the larger problem.

Directors of consultative cooperatives do not hesitate in making changes when there is an indication that such changes are necessary. However, there is no prior commitment to change. Although they recognize the need to change in an uncertain environment, they do not create alternatives in advance. Non-directive and consultative directors use more intuitive and traditional methods for decision-making. These methods are highly idiosyncratic, leading the problem solving in these cooperatives to be more personalized than institutionalized and based on stipulated rules. Some idiosyncratic methods include the 'security method' or choosing the least risky option, the 'delay method' or choosing to postpone the decision as much as possible, and the 'repetition method' or choosing the same alternative as in a previous decision situation.

Figure E.1 shows the catch price setting, one of the most frequent decision situations that the board of directors of non-directive and consultative cooperatives, and members at the administrative level in supervisory and participatory cooperatives, has to carry out. Decisions made by administrative staff during price setting are rather simple, since the decision rule is either the members have a debt with the cooperative. At the beginning, depending on the level of the bargaining power of the cooperative, this and the fish buyer fix the catch's price. Before paying, the buyer discounts any debt that the cooperative has with him. If there is no debt, the original price is maintained. Next, the cooperative fixes the price that is going to be paid to the member.

The first step in price setting from the cooperative to the member is making three types of discounts based on percentages from the members' catch. One discount is a contribution to the cooperatives' administrative costs, the second one contributes to the federation administrative costs, and the third one is directed to the savings fund each member has within the cooperative. This is a payoff rule establishing that all members are granted with such savings depending on their individual catches along the fishing season. These savings are paid to the fisher at the end of the year. In the second step, from the remaining amount of money after the three discounts, the administrative staff has to check if the member has a debt with the cooperative. If there is a debt, another percentage is discounted and the price is reduced again. In the case where there is no debt, the final price is paid to the fisher. Prices with and without discount contribute to the annual member's incomes.

Operational individual decision-making

The members of laissez-aller and autocratic cooperatives mostly make operational decisions because they are only concerned with the course of the daily operations oriented to reach production objective. It was mentioned that these cooperatives have no structural units. As administration is not needed, the usual situations that members more frequently confront are routine and repetitive because they include fishing activities that have been performed for many years. For these members, most problems affect only their daily operations, but not the whole organization's structure. Thus, solutions are specific to isolated problems that affect them directly. Once the solution is implemented, they believe there is no impact on other members or organizational elements, and that the problem will be valid for a long period.

Members in these cooperatives are fundamentally problem avoiders, that is, they try to refrain from making changes. Depending on their personal goals, some of them may resist changing even when
Figure E.1. A schematic catch price setting at administrative level

changes are obviously in their best interest. In this condition, members keep their organizations, which depend highly on their technical operations, on a calm and even course. This is the most effective decision-making style in an environment in which the intermediary buffers the effect of external changes hence there is little need for adaptation. Decisions are made trusting more on intuition, which is helpful because members obtain good approximations to the optimal decision made with formal methods. The drawback of heuristics as decision-making method is that it may lead to biases and discrepancies from reality (Plous, 1993).

Figure E.2 depicts the three most common decision situations that every member of all cooperatives has to deal with every day at the operational level. There are at least three decisions that a fisherman has to make everyday, and they are influenced by a number of variables that he has to consider before making the decision. The first decision, 'Fishing today?' considers weather conditions, social and cultural events, fisheries management constraints, and market variations. Socio-cultural events are related to specific traditional rules to each fishing community, whereas fisheries management regulations have to be complied with according to government regulations. If these variables are unfavorable, it is more likely that the fisherman will not catch the target species that particular day and decide to carry out alternative activities. Otherwise, he will prepare his equipment and boat to travel to the fishing ground he knows is more productive.

The second decision, 'Keep fishing in the same area?,' depends on weather conditions and the abundance of the target species. The fisherman has to decide at this point if there is a need to search for another fishing ground or if it is more convenient to return to the community. Searching for new fishing grounds may be based on information rules, if these allow members to share information on the location of productive fishing spots. Once the member is back, and the catch is
weighed and frozen, he receives a ticket that has to be cashed with the administrative staff. The
same variables considered at the beginning are weighed for the third decision, 'Fishing tomorrow?';
if the answer is yes, the member has to buy the gasoline to be ready the following morning. The
alternative activities may comprise fixing the equipment, washing the nets, visiting relatives in other
communities, attending social or religious events, and the like.

Figure E.2. Schematic decision situations at the operational level