



The technical efficiency in Sardinian fisheries cooperatives

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ABSTRACT

Mediterranean fisheries are characterized by differentiated fishing systems implemented by companies of different sizes and types. On the other hand, small scale fishing is the most important characteristic when one tries to find the main differences with oceanic fisheries. Small-sized family fishing firms play an important role in several local communities and economies, where the globalization of the competitive arena is perceived as one of the worst threats to their survival. One of the organizational solutions adopted by small scale fishing firms in order to face the changing institutional as well as marketing environment is cooperation. Economic performances in fishery have been predominantly determined by adopting vessels as decision-making units. This means that a lack of information exists with reference to fishing companies or cooperatives. This study aims to estimate the economic performances of Sardinian fishing cooperatives by surveying a sample of 104 firms. The research has been carried by first assessing firms' profitability by applying a balance sheet analysis; then, sector technical was estimated as well as scale efficiency. High technical and scale efficiency and substantial technological homogeneity between big and small cooperatives were found. Some policy implications deriving from these findings are discussed in the concluding remarks.

1. Introduction

Small-scale fisheries represent the most important share of Mediterranean fishery. They involve a consistent fleet, constituted by small vessels basically characterized by low tonnage, the use of several and diverse kinds of fishing gear, and small capital investments [18,32,7,25]. Fisheries are generally oriented toward a multi-specific and very large variety of targets [20,40].

However, small-scale fisheries play an important role in several local communities, where the globalization of the competitive arena is perceived as one of the worst threats to their survival. They provide a relevant source of food for people, contribute to reducing poverty, ensure incomes for many families, preserve marine ecosystems and contribute to strengthening social cohesion [7,22,31,33,44].

On the other hand, the artisanal dimension – in the sense of small-scale and low capital intensity – represents a structural barrier to achieving adequate productivity and profitability. As a consequence, fishermen largely tend to associate themselves with cooperatives. Operating in an associated firm would, on the one hand, allow single fishermen to maintain ownership of vessels and other technical inputs, and, on the other, permit them to reduce some costs, mostly transaction costs, and to invest in sharing capital endowment, with possible implications for efficiency and productivity [7,23,24].

With regard to these latter measures, a wide literature exists on estimating economic performance, economic efficiency and capacity in fisheries [3,19,26,32,35,36,42,47]. In the small-scale fisheries, efficiency and their related measures have recently become topics of research among fishery economists in order to provide information about the ability of fishermen to use input bundles at their disposal [37–39,41]. In this regard, technical efficiency, scale efficiency, productivity and the variable input utilization rate allow us – often in tandem with capacity estimation – to obtain some useful measures for policymakers and other decision-makers aiming to rationally manage fisheries' efforts.

However, most studies consider the vessel as the technical unit that reflects the ability of fishermen. In other words, the decision-making unit is generally the vessel and the production frontier is defined with respect to single-trawler performances. This has also been found in the case of small-scale fisheries, even though very often economic choices are not made with reference to single vessels. Indeed, in small-scale fisheries, fishing firms often operate more trawlers, therefore the decision-making unit would concern the firm as a whole.

In the Mediterranean basin, fishery is widely practised by companies that operate a number of vessels. Generally, these companies are represented by cooperatives, implying that some decisions – e.g. the dimension of capital endowment, the typology of labour contracts – are

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directly taken at firm level and not by single fishermen. This means that information on the economic performance of cooperatives is useful to enable a better understanding of the issues and opportunities in the sector, even if a general lack of data exists on this sort of measure throughout the Mediterranean fisheries.

In our opinion, this is a relevant issue because the importance of economic issues is growing among the European policy agenda decision-makers, and in the near future – after 2020 – the Common Fisheries Policy (CFP) and the European Integrated Maritime Policy will increase the attention given to economic features [21]. Therefore, greater knowledge about economic performances, efficiency and their related measures at firm level could enable better calibration of policies with a view to supporting the development of small-scale fisheries in the long term.

Furthermore, the Food and Agriculture Organization [15,16] assigns a strategic role to cooperatives in improving the resilience and stability of fishing communities – based on small-scale fishing – and in enhancing the development of local communities. Basically, the FAO invites more in-depth investigation on the social, political and economic environment that characterizes cooperatives in the governance of small-scale fisheries [30].

In the light of these considerations, this study aims to estimate the economic performances of fishing cooperatives in Sardinia (Italy). Research was carried out on 104 cooperatives and each one involves more small scale vessels. First, profitability of the firms in order to discover the amount of revenue, their profits and main financial indexes were evaluated. Then their technical efficiency was estimated in order to evaluate whether resources at the disposal of fishermen are adequately used and what factors mainly affect productivity and efficiency from an economic perspective. It must be underlined that this is one of the first attempts to investigate economic performances at enterprise level (not considering vessels as the technical unit) in the Mediterranean Sea.

The results can provide useful information for policymakers and stakeholders in order to develop strategies for a sustainable development of the sector. Section 2 illustrates the main literature on the relationship between technical efficiency and cooperative form. Section 3 briefly describes the Sardinian fisheries. Materials and methods are reported in Section 4 whereas results are illustrated in Section 5. Discussion and policy implications are reported in Section 6.

2. Cooperatives and technical efficiency in the economic literature

In the last decades, efficiency of producer cooperatives is becoming an important issue in the economic organization studies [10]. However, because of the huge variability and the complexity that characterize these organizational forms regarding relationships between ownership and control and between management and labour, it is hardly difficult to ascribing empirical applications on efficiency to a univocal theoretical framework [9].

The most of the studies are referred to the seminal “Illyrian model” hypothesized by Ward [48] and developed by Vanek [46]. In reality, this model is particularly suitable for explaining allocative efficiency (in the short-run equilibrium) problems, but, as suggested by several authors, it is not an adequate framework for technical and organizational efficiency problems [9].

Regarding specifically technical efficiency, several studies have concerned the theme of technical performance, both in theoretical and empirical sides. Most of this literature has been comparative by the aim to investigate the TE differentials between cooperatives and conventional firms.

On the basis of some economic theories, cooperatives are expected to show lower technical efficiency levels with respect to private firms because of their relative tendency to have high labour transaction costs. According to Alchian and Demsetz [1], the fact that cooperatives are

generally characterized by a non correlation between individual marginal productivity and specific rewards would cause problems in solving principal-agent problem. This problem is due to the difficulty of measuring individual effort that would force individuals to have more incentive to shirk [5]. Therefore, costs of monitoring labour effort tend to be higher than done by alternative organization forms where it is linked to income [49,50,43].

Nevertheless the lack between incentive and income is not exclusive of cooperatives, but it connotes more kind of enterprises, the problem – according Alchian and Demsetz [1] – would be more serious in the mutual organizations, such as cooperatives, due to the well-known difficulty in purchasing and sending capital stock. The non “marketability” of own quotas by stockholders affects enterprise's ability of improving management in the middle-long run because of impossibility to enlarge adequately capital. As consequence, it should expect a poor improve in measuring and a great shirking by individuals.

In opposition to these theoretical views, other writers have argued that cooperatives would be enabled to achieve higher efficiency level than conventional firms [11,27,5]. The underlying rationale at the basis of this point of view is that the substantial “identity” between workers and ownership and the “democracy” that regulates cooperatives could reduce (or eliminate) some social wasteful conflict in the workplace. In other terms, the employee participation in management should permit to solving the moral hazard problem.

On the other hand, it is reasonable that benefits arisen by “democracy” should wear progressively off with members' enlargement. Indeed, it is logical that an increase of the members would lead to a less concentration of the ownership rights, such as way to reduce individual weight in decision taking. Therefore, incentive to shirk could enhance and efficiency could reduce. Other authors argue that “democracy” in decision making could limit efficiency, especially in the presence of worker heterogeneity [29].

These arguments should suggest that efficiency may depend by several aspects such as the type of cooperative organization, the relationship between ownership and workers, the size of membership, etc.

3. The Sardinian small-scale fisheries

In Sardinia, as well as in many areas of the Mediterranean Sea, small-scale fishing firms are ordinarily organized by cooperatives. This kind of organization allows them to lower some of their costs, such as transaction costs, and, as a consequence, decision-making is bi-level: on the one hand, fishermen that organize fishing *stricto sensu* and own a vessel(s), and, on the other, cooperative management that decides on strategic approaches, handles financial activities (e.g. co-management of common spaces, purchase of technical inputs useful for other fishermen, payment of taxes) and invests in sharing capital endowment.

Fishery is traditionally practised along the Sardinian coasts and the fleet is mostly composed of “artisan” trawlers [28,32]. Indeed, about 80% of the vessels are small-scale boats that operate close to the coast (Table 1). This small-scale fishery contributes to most of the total regional fishery production both in terms of captures and value. Furthermore, the time spent by small-scale fishermen at sea amounts to about 90% of the overall time.

Table 1
Main economic characteristics of Sardinian fisheries – year 2015.
Source: our elaborations from ISTAT.

	Unit	Small scale	Total	%
Vessels	N.	1032	1303	79.2%
Captures	Tons	4389	7082	62.0%
Revenues	M Euro	33.4	52.1	64.1%
Days at sea	N.	127,501	142,789	89.3%

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