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Unraveling agricultural cooperatives' performance measurement: a literature review

REVIEW ARTICLE

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Abstract

Cooperatives are a widely prevalent organizational form in the agrifood sector that have been extensively examined in the literature. The primary objective of this literature review is to evaluate approaches taken in studying the performance of these organizations, with a specific focus on whether these analyses have duly recognized the multifaceted nature of cooperatives, characterized by having multiple objectives. Second, the review examines research comparing cooperatives with other types of organizations to ascertain whether, despite operating in the same markets, such analyses have acknowledged that these organizations pursue vastly different objectives. Finally, this literature review also ascertains whether studies have considered the influence of organizational innovations (e.g. allowing capitalist investors or share transferability) on cooperatives' performance. Correctly approximating how to measure the performance of agrifood cooperatives is critical to understanding their success and evolution and, significantly, whether they benefit from innovations in property rights and governance.

Keywords: agrifood cooperatives, efficiency, farmers, financial results, performance

JEL-codes: P13, Q13, M10

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1. Introduction

Cooperatives play a key role in the agrifood sector's economic sustainability (Cook, 2018), particularly in terms of including smallholders and closing the income gap. The World Cooperative Monitor (2022: p. 13) highlights the economic importance of cooperatives, noting that the 300 largest cooperatives in the world generate 2171 billion dollars in turnover, with agrifood cooperatives representing one-third (100 enterprises). Cooperatives are organizational (and legal) tools that structure relationships among many resource owners, resulting in organizations that improve smallholders' economic sustainability, reduce the market power of other value chain stages, and give farmers control over their production (Bijman and Hendrikse, 2003). As Cook (2018) recognizes, agricultural cooperatives are born as collaborative attempts to reinforce the economic position of farmers. In fact, they are organizations that lower farmers' transaction costs and redistribute rents in their favor (Grau *et al.*, 2015).

The economics and business literature has deeply analyzed cooperatives since they present particularities concerning other types of organizations (Benos *et al.*, 2016). Cooperatives have been defined as “from members, by members, and to members” (Ishak *et al.*, 2020) and are formed by members with common objectives who agree to work cooperatively in a democratic manner to serve their interests. However, they also show important limitations in terms of ownership and governance structures (Alchian and Demsetz, 1972; Cook, 1995) (e.g. restrictions on access to capital or free-riding problems). Legislators, practitioners, and organizational academics have proposed important organizational innovations to overcome these limitations in recent years. These modifications would include changes in members' ownership and control rights (Chaddad and Cook, 2004) (e.g. allowing capitalist investors and share transferability).

Measuring the performance of cooperatives is a critical challenge for organizational academics (Grashuis and Franken, 2020). Without correctly measuring their performance, it is impossible to determine whether the introduced organizational innovations improve the results of traditional cooperatives or if they can even be compared to other types of organizations, as the literature has frequently done with IOFs. Evaluating the performance of cooperatives poses a challenge due to their diverse and multifaceted nature, where singular objectives may not be readily quantifiable (Draheim, 1952). Cooperatives must obtain good economic results to continue their economic activity but also meet their members' needs (Benos *et al.*, 2018). These objectives can be contradictory since cooperative performance may be at the expense of not meeting the needs of members. Conversely, fulfilling member needs may compromise cooperative performance.

Consequently, this paper aims to carry out a systematic literature review that analyses how the performance of cooperatives has been measured over the years, the problems arising when comparing cooperatives' performance with that of other types of organizations, and whether these measures have considered changes introduced by new governance structures of cooperatives. Notably, we want to answer the following three research questions (RQ):

RQ1: Which indicators have been used to measure the performance of agrifood cooperatives? Do they consider that cooperatives are multiobjective organizations?

RQ2: What are the main problems when comparing the performance of cooperatives and other organizations, mainly IOFs?

RQ3: Has and, if so, how has the literature considered the effect of governance and ownership innovations on cooperatives' performance?

Some previous literature reviews have analyzed performance measurement in cooperatives (Benos *et al.*, 2018; Grashuis and Su, 2019; Soboh *et al.*, 2009; Zakariaa *et al.*, 2020). Whereas Zakariaa *et al.* (2020) do not focus on any sector, Grashuis and Su (2019) analyze the literature on agricultural cooperatives from a holistic perspective, considering not only performance but also ownership, governance, finance, and membership attitude. Benos *et al.* (2018) develop a “currency matrix” to measure the performance of agricultural

cooperatives considering their dual nature (social enterprises that must maintain financial viability through market competition). Soboh *et al.* (2009) review the literature on the performance of agrifood marketing cooperatives to check possible discrepancies between theoretical models and empirical appraisals. They divide the literature between those articles that consider cooperatives as multipurpose entities (born to meet member needs and survive) and those that consider that cooperatives are single objective entities (satisfy members or maximize the performance of cooperatives).

This systematic review complements the literature by reviewing published articles under the optics of cooperatives as multiobjective organizations, assessing the appropriateness of the indicators used, analyzing the suitability of the comparisons of cooperatives and other types of organizations, and whether (and how) they have considered the impact of organizational innovations on performance.

The article follows a traditional methodology of systematic literature reviews (Tranfield *et al.*, 2003). We analyzed 175 articles in depth, finding substantial diversity across performance measurements, discovering inconsistencies and problems in comparing the performance of cooperatives versus other types of organizations, and finding that researchers have paid scant, and sometimes inappropriate, attention to the impact of organizational innovations on the measure of cooperative performance.

The remainder of this review is structured as follows: first, the research methodology and the dataset are described. Then, articles are analyzed in depth to consider how they measure cooperative performance. Third, the main findings of the literature review are discussed, pointing out the weaknesses found in the analysis and opening potential ways to solve them. Finally, the key findings and conclusions are highlighted.

2. Research methodology and sample description

2.1. Research methodology

Systematic literature reviews aim to synthesize research in a particular field in a transparent, scientific, and replicable way. The aim of these studies is to identify key contributions to a particular topic and to inform future research needs (Tranfield *et al.*, 2003). One of the basic requirements of this type of research is to detail each of the steps that have been taken to obtain the final database (Hiebl, 2021; Williams *et al.*, 2020).

The first step requires the identification of the significant literature, which is the largest challenge of any systematic review. The main bibliographic databases (Archambault *et al.*, 2009; Falagas *et al.*, 2008; Pranckutė, 2021) were used: Web of Science (WoS) and Scopus. The review was conducted in July 2023, and the search string was designed considering the main keywords related to the objectives of this research (see Table 1). Neither timeline nor geographical restrictions were applied, and the topic encompasses business, management, economics, agricultural economics, finance, and political science fields.

Table 1. Search string

	AND					
	Cooperative		Performance		Agrifood	
OR	“coop*”	“co-op*”	“performance”	“satisf*”	“agri*”	“food*”
			“profitability”	“longevity”	“agro*”	“produc*”
			“result”	“price”	“primary	“farm* sector”
			“benefit”	“sustainab*”		
			“efficiency”	“gain”		

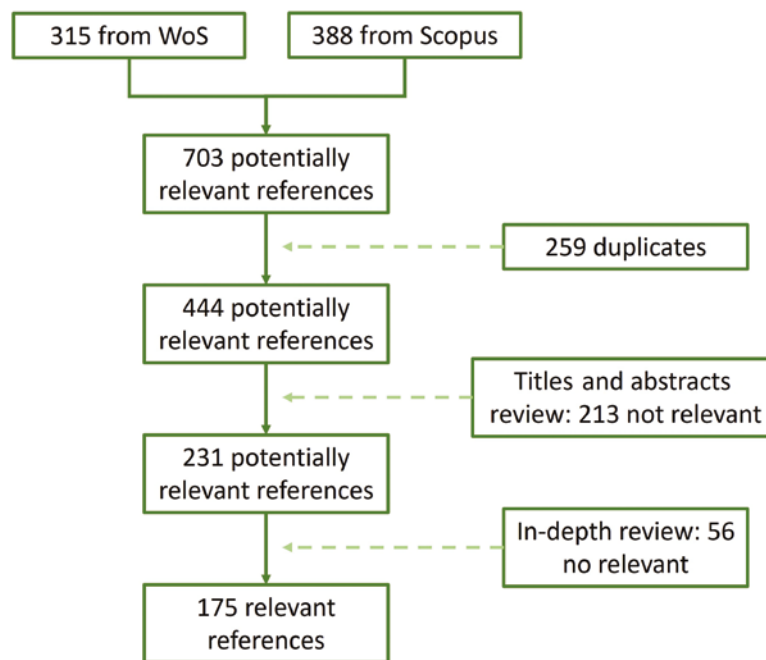


Figure 1. Development of the systematic literature review.

Applying the research string, an initial database of 703 papers (315 from WoS and 388 from Scopus) was obtained. The next step was the elimination of duplicates (259). Once the initial sample was accessed, the process of selecting final items began. To guarantee the transparency and replicability of the review, the inclusion and exclusion criteria of the systematic review protocol were designed and applied. Studies were included if they: (1) were empirical; (2) measured a relationship between at least two variables; (3) analyzed agrifood cooperatives; and (4) designed/applied a performance measure. At the same time, studies were excluded if they focused on: (1) credit cooperatives; (2) non-agrifood cooperatives; (3) literature reviews; (4) cooperation games; and (5) cooperation capabilities.

After reviewing titles and abstracts, 213 papers were removed because they were not directly related to the objective of this review. Then, 231 papers were carefully read, leading to the elimination of 56 papers (see Figure 1). Finally, the 175 selected articles were analyzed in depth. The Appendix that can be accessed at [10.6084/m9.figshare.24356566](https://doi.org/10.6084/m9.figshare.24356566) lists all the papers included in the dataset.

2.2. Sample description

The geographical scope of the selected articles is international. The most common continents are Europe and Asia, followed by America (see Table 2). If the geographical analysis is made considering countries, then studies based on Spanish cooperatives are the most common (25), followed by those based on US and Chinese cooperatives (20 and 16, respectively).

Over 42% of the articles were published in journals specialized in agricultural economics; almost 19% were published in journals specialized in cooperative enterprises, approximately 6% were published in journals specialized in sustainability, and the remaining, approximately one-third of the total, were published in general economics, business, and management journals (see Table 3).

Considering the JCR impact factor of the papers in the year of publication (see Table 4), more than 61% of papers were indexed, and 25.7% were published in Q1 or Q2 journals. When considering Scimago Journal

Table 2. Geographical scope of the articles studied

Area	Number	%
Europe	69	39.5%
Asia	49	28.0%
America	37	21.1%
Africa	20	11.4%

Table 3. Journal specialization

Topic	Number	%
Agricultural journals	74	42.3
Cooperatives journals	33	18.9
Sustainability journals	11	6.3
General economic, business or management journals	57	32.6

Table 4. Journal impact factors

JCR quartile	Number	%	SJR quartile	Number	%
1	22	12.6	1	51	29.1
2	23	13.1	2	75	42.9
3	35	20.0	3	21	12.0
4	28	16.0	4	3	1.7
No JCR	67	38.3	No SJR	25	14.3

& Country Rank, over 85% of the articles were indexed, with a significant portion, 72%, falling within Q1 or Q2 (see Table 4).

A preliminary analysis of how cooperative performance is measured shows that papers use two main indicator categories (see Table 5): (i) cooperative-level (68.6%); and (ii) farmer-level performance indicators (25.7%). They can be split into financial, efficiency, market, and sustainability indicators (for cooperatives) and financial, efficiency, market, and satisfaction/commitment indicators (for farmers). Papers simultaneously considering cooperative, and farmers' performance are a minority (5.7%).

The largest group of studies (42.6%) do not focus on a specific category of cooperatives but analyze various types and sometimes operate in different agrifood sectors. Nearly 33% of the articles analyze cooperatives that process and sell farmers' products. Moreover, 24% of the papers study cooperatives whose main objective is to market their members' production.

In isolation or combined, two theoretical approaches are the most frequently used to study agricultural cooperatives' performance: neoclassical economics and the tandem transaction cost economics/agency theory. Thus, 46.3% of the papers use the basic assumptions of neoclassical theory, i.e. profit maximization. Furthermore, nearly 42% of the papers mention transaction cost economics or agency theory. Notably, 17% of the analyzed papers are purely empirical, and no theoretical approach is explicitly mentioned or identifiable.

Table 5. Performance indicators

	Measure	Number	%
Based on cooperatives' results	Financial	60	34.3
	Efficiency	28	16.0
	Market	12	6.9
	Sustainability	2	1.1
	Combination	14	8.0
	Others	4	2.3
	Financial	11	6.3
Based on farmers' results	Efficiency	12	6.9
	Market	4	2.3
	Satisfaction/Commitment	11	6.3
Cooperatives and farmers' results	Combination	5	2.8
	Others	2	1.1
	Combination	10	5.7

Finally, even though no time restriction was made, the literature review covers thirty-nine years (from 1984 to 2023). However, more than 70% of articles were published after 2015. Therefore, there has been increasing interest in agrifood cooperatives and their performance in recent years. Comparing these periods (before and after 2015), noteworthy changes are detected. First, there have been changes in the geographical scope of research. Whereas approximately 80% of papers were from Europe and America in the first period, from 2015 to 2023, an internationalization process occurred, and nearly half of the papers are based on neither European nor American data. Second, there are also differences in journal quality. Whereas in the first period, only 39% of papers were indexed in JCR, in the second period, this percentage was approximately 69%. Finally, there are differences in the performance measures used. From 1984 to 2014, the most common were cooperatives' financial and efficiency ratios. However, in the second period, there was a notable increase in the number of papers based on farmers' results. In sum, the growing interest in agrifood cooperative performance has translated into an increase in the number of papers in recent years, a broader geographical scope, a higher quality of journals, and a shift in the performance indicators used.

3. Cooperative performance: Main measures and results

The primary objective of cooperatives is to meet their membership needs (Iliopoulos and Cook, 2023; Soboh *et al.*, 2009). However, to accomplish that goal, it is essential for cooperatives to be financially viable, allowing them to compete in markets and ensure their longevity (Soboh *et al.*, 2009). This juxtaposition of somewhat conflicting objectives has led the literature to adopt diverse approaches when analyzing their performance.

To enhance the comprehension of the results and adhere to the theoretical proposition presented by Soboh *et al.* (2009) and the research questions, this systematic literature review categorized the articles into two main groups. First, we will examine articles that analyze the cooperative or farmers' groups' results in isolation. These articles consider that cooperatives have a single objective (Soboh *et al.*, 2009): to maximize members' performance (through dividends, raw materials payments, or services) or to maximize cooperative performance. Although there are some alternative measures, such as longevity (Grashuis, 2020a; Zhong *et al.*, 2022) or economic viability (Donovan *et al.*, 2017), these studies investigate mainly the financial, efficiency, market, sustainability, or satisfaction/commitment outcomes of cooperatives or farmers. This group of articles will be divided into two subsections: cooperatives and farmers. Finally, we will explore articles that view cooperatives as multipurpose entities, meaning they assess performance by combining the cooperative's results with those of its members.

3.1. Articles based on cooperatives' results

Half of the articles on cooperatives' results are based on financial ratios. These papers consider liquidity (Rahmah, 2020), ROA (De Souza Junior *et al.*, 2020), net profit (Shelenko *et al.*, 2022; Wouterse and Francesconi, 2016), profit margin (Chi *et al.*, 2021), turnover (Barry and Rousselière, 2022), ROE (Grashuis, 2018; Pokharel *et al.*, 2020), or a combination of financial ratios: ROE and ROA in Castillo-Valero *et al.* (2015) or Ngamjan and Buranasiri (2020); ROA, ROI, ROE and liquidity in Marcis *et al.* (2019); ROI and ROE in Sala-Ríos (2022); net sales and net income in Grashuis (2019); or profitability, solvency, and sales in Baourakis *et al.* (2004).

The articles analyze the influence of several variables on those financial results. Singh *et al.* (2019) study how sensitive US cooperatives are to economic policy uncertainty, showing that these businesses suffer substantial ROA variations if micro- and/or macroeconomic changes occur. They also study the size effect (measured as total assets) on performance, concluding that small agrifood cooperatives obtain a higher ROA than do large ones. These results align with those reached by De Souza Junior *et al.* (2020) for Brazilian cooperatives, Hailu *et al.* (2007) for Canadian marketing cooperatives, and Khafid and Nurlaili (2017) in Indonesia. Lerman and Parliament (1991) conclude that size increases may only sometimes result in beneficial effects on processing and marketing US agricultural cooperatives' performance (measured in terms of leverage, liquidity, and ROE), but they improve asset turnover through economies of scale. Pokharel *et al.* (2020), Pokharel *et al.* (2019), Richards and Manfredo (2003), Sala-Ríos (2023), and Sebhatu *et al.* (2021), however, reach the opposite result for US, Spanish and Ethiopian (processing and marketing) cooperatives: size has a positive impact on cooperatives' performance (measured by ROE and profit). Musson and Rousselière (2020) also conclude the same for French cooperatives: the best strategy to improve results is to increase size in terms of assets and members.

Regarding membership size, three different results can be highlighted. First, Melià-Martí *et al.* (2017) conclude that membership size adversely affects Spanish cooperatives' financial performance. Grashuis (2020a) proves that relatively small and relatively large processing and marketing US cooperatives (in membership terms) have a lower risk of failure than medium-sized organizations. Barry and Rousselière (2022) confirm that increases in membership initially have positive effects on French marketing cooperatives' turnover, but this effect decreases when membership reaches a certain level. However, Liang *et al.* (2023) conclude that membership size has a positive and significant relationship with total profits and an inverted U-shaped relationship when profits per member are analyzed for Chinese cooperatives.

Membership and asset growth are also subjects of study in Grashuis' research (2023). This study analyzes the impact of mergers and acquisitions on US cooperatives' profitability, including ROE, ROA, ROS and capital structure. The findings indicate that cooperatives do not improve performance after undergoing a merger or acquisition process. Melià-Martí and Martínez-García (2015) also investigate mergers in Spain and, according to their findings, the financial attractiveness of merging two or more organizations is only realized when there is an effective integration of the cooperatives, going beyond a mere legal merger. Strategic alliances between processing and marketing Italian wine cooperatives and corporations were studied by Borsellino *et al.* (2020), who prove a positive and significant relationship between profitability and the maintenance of alliances.

De Souza Junior *et al.* (2020), Martins and Lucato (2018), Martins *et al.* (2019), Mauget and Declerck (1996) (processing and marketing cooperatives), and Trechter (1996) (marketing cooperatives) analyze the effects of activity diversification on performance for Brazilian, European and US cooperatives. However, their studies do not find empirical support for the hypothesis that diversification leads to positive financial results. Furthermore, Mauget and Declerck (1996) conclude that non-diversified European cooperatives perform better than multipurpose ones. Product and service portfolio diversification is also studied by Grashuis and Franken (2020), who prove that diversification reduces US cooperatives' probability of failure.

Internationalization is another variable considered. Heyder *et al.* (2011) and Mozas-Moral *et al.* (2021) prove that access to international markets improves European marketing and processing cooperatives' turnover. Mozas-Moral *et al.* (2021) also analyze vertical integration as a positive strategy for Spanish cooperatives. These results are similar to those of Zhong *et al.* (2018) for Chinese processing and marketing cooperatives.

The presence of women on decision-making teams is studied by Chi *et al.* (2021), Hernández-Nicolás *et al.* (2019), Liu and Li (2018), Ortiz *et al.* (2020), and Sebhatu *et al.* (2021), but they reach no consensus. On the one hand, Chi *et al.* (2021), Hernández-Nicolás *et al.* (2019), Liu and Li (2018), and Ortiz *et al.* (2020) find a positive relationship between female presence and financial results (in terms of ROE, ROA, and profit margin) for Chinese and Spanish cooperatives. On the other hand, Sebhatu *et al.* (2021) show a negative correlation between sales per member and profit in processing and marketing Ethiopian cooperatives. Meliá-Martí *et al.* (2020) also study the effects of female representation on Boards of Directors (BoDs) in Spanish cooperatives but cannot demonstrate any significant relationship (ROE).

Another significant aspect analyzed through financial performance measures involves comparing IOFs and cooperatives. Despite their relative prevalence, a definitive consensus on the results or the appropriate measure to be used remains elusive. Grashuis (2020b) utilizes raw materials' prices as a performance measure and concludes that, on average, US processing and marketing cooperatives pay less than IOFs. However, this research acknowledges that cooperatives exert competitive pressure in their respective regions, leading IOFs to raise their purchase prices for raw materials. Ferrer *et al.* (2019), for Spanish (processing and marketing) wine cooperatives, Lerman and Parliament, (1990) for US cooperatives, Notta and Vlachvei (2007), for Greek (processing and marketing) dairy cooperatives, and Soboh *et al.* (2012), for European cooperatives successfully demonstrate that cooperatives outperform IOFs in terms of financial results, including metrics such as ROE and net profits, profitability, ROE and asset turnover, and profitability, respectively. Similarly, D'Amato *et al.* (2022), employing an adjusted measure based on EBITDA minus the cost of raw materials, arrive at the same conclusion when analyzing Italian processing and marketing wine cooperatives.

Montero and Pacheco (2018) present evidence showing that Spanish cooperatives are less profitable than IOFs by examining solvency and liquidity ratios. Challita *et al.* (2019) also reach a similar result using ROA and ROS of processing and marketing French cooperatives. Parente and Karantininis (2000) obtain identical results and justify them by pointing to the risk aversion of Portuguese processing and marketing wine cooperatives. The absence of profit-oriented decisions is alleged in the case of Chinese cooperatives (Chen *et al.*, 2017). Finally, Hind (1994) discovers no significant differences between the two types of organizations when profitability and liquidity are considered.

Seven articles employ financial measures to analyze the impacts of innovative governance arrangements such as professional managers, capital-seeking entities, or the presence of capital investors. Among others, Chibanda *et al.* (2009), Kontogeorgos *et al.* (2018) and Meliá-Martí *et al.* (2017) argue that new organizational attributes and business models positively affect performance, transparency, market position, and social responsibility for South African (processing and marketing), Greek and Spanish cooperatives. Kontogeorgos *et al.* (2018) analyzed the impact of size (assets) in traditional vs. restructured Greek cooperatives, concluding that while size negatively affects traditional cooperatives' performance (gross profit over sales), it has a positive impact on restructured cooperatives.

In contrast, Bijman *et al.* (2013) and Kyriakopoulos *et al.* (2004) find that organizational innovations are negatively correlated with performance in Dutch and Danish (supply and marketing) cooperatives. Bijman *et al.* (2013) suggest that a cooperative's performance (returns on total assets and equity, assets and sales growth) is influenced by the supply chain position occupied by the cooperative, the internal governance, and the macroeconomic environment. Moreover, Bijman *et al.* (2013) analyzed the relationship between business governance and performance (measured as ROE and ROA) and compared the traditional cooperative model with two others with organizational innovations: one in which the BoD no longer consists of cooperative

members (the BoD is professional) and another in which there is a legal separation between the cooperative association and the firm that commercializes and transforms the cooperative's raw materials. Comparing traditional and new governance structures, they conclude that traditional cooperatives outperform all other types from the farmer's perspective. However, these entities do not have good sales and asset growth because traditional cooperatives tend to maintain their size. This trend means that traditional cooperatives are lacking in terms of market competitiveness.

Couderc and Marchini (2011) and Rebelo *et al.* (2017) do not find a significant relationship between cooperatives' performance and their management and ownership structures. Couderc and Marchini (2011) analyze the effect of novel governance features on French processing and marketing wine cooperatives' performance (measured by total sales per product unit). The existence of professional managers and the entry of external capital are the main governance variables used to prove these effects. Nevertheless, no relationship is found. Rebelo *et al.* (2017) discuss expert managers' impact. They conclude that a professional manager's existence does not enhance the financial performance of Portuguese processing and marketing oil cooperatives (in terms of ROA and net profitability).

The following most used indicators are those based on the cooperative's efficiency. Almost all the literature on efficiency starts from the idea that cooperatives suffer from efficiency problems due, in part, to higher control costs compared to other types of organizations (Zhou *et al.*, 2020). This problem occurs because of the limited number of incentives to collaborate in cooperative control, given that a member's effort benefits all members, not just themselves. Some cooperative experts use classical efficiency ratios that compare production with the input used (e.g. Boyle, 2004; Mnisí and Alhassan, 2020; Salazar Terreros and Galve Gorriz, 2011a). However, most of the literature on cooperatives analyzes efficiency using the DEA approach (e.g. Acosta-Hemthrot *et al.*, 2021; Chen *et al.*, 2013; Huang *et al.*, 2013; Zaimova *et al.*, 2018). Most articles analyze technical efficiency (e.g. Aldaz Ibáñez *et al.*, 2021; Mikami, 2018). However, some authors employ additional metrics, such as allocative efficiency (e.g. Singh *et al.*, 2001).

Krasachat and Chimkul (2009), for Thai marketing rice cooperatives, and Yobe *et al.* (2020), for South African cooperatives, conclude that larger and older cooperatives (assets) are more efficient. Similar results are reached by Othman *et al.* (2014), who conclude that Malaysian cooperatives' size can also explain efficiency problems. However, Caputo and Lynch (1993) deduce that size is unrelated to the technical efficiency of US processing and marketing cotton cooperatives. In turn, Xaba *et al.* (2019) propose a solution to skip efficiency problems in South African processing and marketing cooperatives: to create secondary cooperatives to increase economies of scale.

Most efficiency analyses that compare IOFs and cooperatives have shown a worse position for cooperatives (e.g. Brandano *et al.*, 2019; Ferrier and Porter, 1991; Martínez-Victoria *et al.*, 2018). Ahn *et al.* (2012) conclude that there are no significant differences between Salvadoran marketing cooperatives and IOFs in various sectors. However, some authors, such as Boyd (1987), for Yugoslavian cooperatives, Kapelko *et al.* (2019), for Spanish processing and marketing oil cooperatives, Maietta and Sena (2007; 2010), for Italian wine cooperatives, and Salazar Terreros and Galve Gorriz (2011b), for Spanish wine cooperatives, compare cooperatives and IOF technical efficiency results and conclude that cooperatives could be equal to or even more efficient than IOFs. In addition, Kapelko *et al.*'s (2019) results show that cooperatives overcome coordination problems and increase efficiency by integrating supplier and transformation processes. Becchetti and Pisani (2015) measure Italian cooperatives' efficiency as the "number of beneficiaries served for a given level of labor and capital inputs". This measure is positively influenced by product/service innovation, firm age, a properly developed strategy (especially a market strategy), and managerial turnover. Soboh *et al.* (2012) develop an efficiency analysis applying a "traditional" analysis to IOFs and a "new" optimization model to European cooperatives. The "cooperative optimization model" is defined as the maximization of output and the primary raw material used (the material that comes from its members) while minimizing the remaining inputs. They prove that the technical efficiency results are similar, and the comparative efficiency problems of cooperatives fade away.

Two articles analyze the relationship between organizational innovations and efficiency. On the one hand, Salazar Terreros and Galve Gorriz (2011a) conduct their study using a sample of Spanish processing and marketing wine cooperatives, showing that adopting actualization mechanisms for updating members' equity capital contributions is correlated with a higher level of downstream vertical integration. Their results also show that the most efficient cooperatives are those with a more vertically integrated structure. On the other hand, Mikami (2018) shows that for Yugoslavian cooperatives, introducing tradable membership shares would provoke them to become as efficient as IOFs.

A minority of papers in the dataset are based on cooperative market indicators, such as product quality (Fanash and Frick, 2018; López-Bayón *et al.*, 2018; Pennerstorfer and Weiss, 2013), market share (Brusselsaers *et al.*, 2014; Foxall, 1984; Grau *et al.*, 2015), corporate reputation (Castilla-Polo *et al.*, 2018, Graca and Arnaldo, 2016), innovative performance (Sama-Berrocal and Corchuelo Martínez-Azúa, 2023) or value added (Esnard *et al.*, 2017; Nikishyna *et al.*, 2018). This approach reinforces the need for cooperatives to become more market oriented.

Brusselsaers *et al.* (2014) analyze the influence of the quantity and quality of policies in the EU and conclude that policy measures do not necessarily improve cooperative performance (measured as market share). Furthermore, their research confirms that EU policy does not support relatively good cooperatives (high market share).

Castilla-Polo *et al.* (2018) demonstrate that Spanish processing and marketing oil cooperatives' reputation (innovation, certification systems, social responsibility, and awards) is positively related to performance. Similarly, Graca and Arnaldo (2016) prove a positive relationship between the reputation of Spanish and Portuguese dairy cooperatives and members' trust, loyalty, and satisfaction. Finally, Esnard *et al.* (2017) observe low levels of value added in St. Lucía in those supply chains where a marketing cooperative operates. This lack of a market-oriented strategy is partially due to free-rider problems that discourage long-term investments and can be solved by linking member investment directly to patronage or implementing organizational innovations.

López-Bayón *et al.* (2018) and Pennerstorfer and Weiss (2013) analyze quality differences in the final products of IOFs vs. processing and marketing cooperatives in Spain and Austria, respectively. They prove that cooperatives' products are of lower quality compared to those of IOFs. Pennerstorfer and Weiss (2013) recognize that the free-riding problem could affect these results if "members of a cooperative do not receive the full benefits of their investment in product quality and, thus, tend to deliver products of lower quality" (Pennerstorfer and Weiss, 2013, p. 157). The above authors point out an opportunity to correct this: to design an appropriate incentive system to align preferences. Similar results are reached by López-Bayón *et al.* (2018): the presence of a cooperative in the supply chain harms quality. Irrespective of the level of vertical integration, the study highlights the crucial role played by the organizational structure of the supply chain in determining product quality. Foxall (1984), for the United Kingdom, and Grau *et al.* (2015), for Germany, prove that the organizational form is related to market share in processing and marketing cooperatives. Innovations in governance and ownership structures improve market orientation and performance.

Although it is not a frequent topic, some researchers analyze cooperatives' performance considering their sustainability practices (e.g. Ferreira Da Silva *et al.*, 2022; Ferrer *et al.*, 2023; and Ji *et al.*, 2018). Spanish processing and marketing wine cooperatives show high levels of sustainable practices, but IOFs are ironically better (Ferrer *et al.*, 2023).

Fourteen studies combine two or more cooperatives' performance measures. Featherstone and Al Kherajji (1995), Grashuis (2018), Guzmán-Raja and Arcas-Lario (2008) and Skevas and Grashuis (2020) analyze cooperatives' financial and efficiency results. Guzmán-Raja and Arcas-Lario (2008) analyze the complementarity of two measures: technical efficiency (DEA and labor productivity) and traditional financial analysis (rotation

of sales over fixed assets and turnover to net assets), concluding that Spanish fruit and vegetables marketing cooperatives are inefficient; these results are in line with financial ratios. Skevas and Grashuis (2020) find that technical efficiency is influenced by US marketing grain cooperatives' liquidity, membership size, and age. Furthermore, financial pressure in Italian processing and marketing wine cooperatives induces members to be more efficient (Maietta and Sena, 2010).

Al Idrus *et al.* (2018), Arcas-Lario and Hernández-Espallardo (2003) and Sisay *et al.* (2017) study the relationship between financial results and market orientation. Even though the above papers analyze similar variables, they have yet to reach a consensus. Sisay *et al.* (2017) prove that financial performance (assets, market share, capital, and net profit growth) in Ethiopian processing and marketing seed cooperatives is positively influenced by the development of customer and supplier orientation (Likert scale). However, Al Idrus *et al.* (2018) conclude that market orientation can decrease Indonesian processing and marketing dairy cooperatives' performance for several reasons, such as poor management or the inability to cover the international market. However, market orientation increases job satisfaction, thus positively affecting employees' performance and, in the last term, cooperatives' financial performance. In summary, Al Idrus *et al.* (2018) propose that if managers realize how important it is to increase job satisfaction, they lead their cooperatives toward performance improvements. Höhler and Köhl (2014) demonstrate that European cooperatives that modify their governance and ownership structures become more market-oriented and improve their competitive positioning. However, Kyriakopoulos *et al.* (2004) do not find a significant relationship between market orientation and Denmark's supply and marketing cooperatives' structure.

Buang *et al.* (2023), Ishak and Omar (2023), Nath and Arrawatia (2022), and Nguyen *et al.* (2023) conduct studies on the relationship between social performance (including labor conditions, sense of community, and human capability) and financial results. Buang *et al.* (2023) and Ishak and Omar (2023) find no significant relationship between social performance (specifically labor conditions and transparency and communication) and the overall performance of processing and marketing Indonesian and Malaysian cooperatives. Nath and Arrawatia (2022), on the other hand, demonstrate that Indian processing and marketing dairy cooperatives with strong social performance (particularly in community support) are more likely to receive government support, although this does not necessarily impact their autonomy. Finally, Nguyen *et al.* (2023) conclude that internet use positively influences social performance (labor conditions and labor involvement) in Vietnam.

3.2. Articles based on the farmers' results

Since cooperatives are social-based enterprises, members' outcomes also feed cooperative performance and influence the cooperative decision-making process (Serra and Davidson, 2021; Singh, 2023). In fact, a cooperative's longevity is dependent on its members' satisfaction (Grashuis and Cook, 2019). Nevertheless, studies that consider members' performance are less common than are those considering the cooperative's performance. Farmers' performance is measured using four main indicators: financial results, efficiency, market indicators and satisfaction/commitment.

Based on farmers' financial results, comparisons of members vs. nonmembers are common. Mishra *et al.* (2018), Palkovič *et al.* (2022), and Ravishankara *et al.* (2019) compare the financial results of cooperative members and nonmembers and prove that members are better in financial terms. Palkovič *et al.* (2022) conclude that Slovakian cooperative members obtain high revenue because they exploit economies of scale. Furthermore, the bargaining position of farmers also improves. Ravishankara *et al.* (2019) justify these results for Indian processing and marketing dairy cooperatives in the improvement of cost structures: their results prove that cooperative members have a lower unit cost than nonmembers. Finally, Mishra *et al.* (2018) highlight the importance of Nepali processing and marketing tomato cooperatives because they provide farmers with information, services, and new technologies.

Ma *et al.* (2022) study the financial consequences of a Chinese processing and marketing banana cooperative membership and conclude that it increases net returns, profit margins, and ROI. Wollni and Zeller (2007)

demonstrate a positive relationship between being a Costa Rican marketing coffee cooperative member, the prices received, and access to information. Similar results are reached by Tran *et al.* (2022) for Vietnam's rice marketing cooperatives. Some researchers have differing views on cooperative membership's overall positive financial effects. Shumeta and D'Haese (2016) analyze the income and production of Ethiopian marketing coffee cooperatives' members and nonmembers and conclude that there are no significant differences. Furthermore, they prove that heterogeneity in members' characteristics should be considered.

Differences between the suppliers (or members-suppliers) of IOFs and cooperatives are also studied in terms of efficiency. Cooperatives are formed to satisfy members' needs. Improving farm efficiency should be one of their main objectives (Zamani *et al.*, 2019). There is almost a consensus: cooperative membership improves efficiency (Gong *et al.*, 2019; Grashuis and Skevas, 2023; Kashiwagi, 2020; Manda *et al.*, 2020; Neupane *et al.*, 2022; or Zamani *et al.*, 2019). The reasons behind these results are related to the productive services and inputs provided by cooperatives (Abate *et al.*, 2014; Cuevas and Mina, 2022; or Ma *et al.*, 2018).

Gong *et al.* (2019) analyze Chinese farmers' efficiency considering their position in a marketing cooperative (investor members, non-investor members, or nonmembers), proving that the highest technical efficiency is that of the core members (those who are suppliers and investors). However, Vandeplass *et al.* (2013) conclude that Indian farmers in channels with a processing or marketing cooperative are less efficient but equally profitable than their IOF counterparts. Cao *et al.* (2017) study the factors affecting the efficiency of Vietnam's marketing rice cooperative members. Farm size, experience, training, and labor have a positive relationship. However, their positive effect on technical efficiency depends on farmers' attendance at the cooperative's training activities.

While infrequent, some articles employ alternative market measures, such as value added (Cruz *et al.*, 2023), raw material sales (Miller and Mullally, 2022), and cooperative-offered prices (Getnet *et al.*, 2018; Malvido *et al.*, 2019), to approximate farmers' yields. Cruz *et al.* (2023) acknowledge that Philippine marketing coffee cooperatives' membership enhances farmers' selling efficiency due to shared activities within the cooperative. This finding is corroborated by Getnet *et al.* (2018), who report that members of an Ethiopian marketing sesame cooperative obtain higher prices. However, Malvido *et al.* (2019) do not reach the same conclusion for Argentine cooperatives; they find that farmers working with processing or marketing dairy cooperatives experience lower price productivity. These divergent outcomes underscore the complexity of the relationship between cooperative membership and farmers' performance, warranting the necessity of further investigation in this area.

Finally, Alho (2015), Arcas-Lario *et al.* (2013; 2014), Donkor and Hejkrlik (2021), Figueiredo and Franco (2018), Grashuis and Cook (2019; 2021), Hernández-Espallardo *et al.* (2013), Higuchi *et al.* (2020), and Prasertsang *et al.* (2020) analyze collective success using farmers' satisfaction/commitment. While authors may employ diverse measurement scales, the predominant approach involves gathering subjective data through surveys conducted among farmers. These surveys typically gauge farmers' satisfaction with their cooperatives, the provided services, and the pricing structure. A stable market channel, collection of all agricultural production, expansion possibilities, proximity, good services, and good bargaining position are the main benefits that members obtain. However, the importance of these advantages depends on the type of cooperative (supply dairy, marketing dairy, or meat) (Alho, 2015). Hernández-Espallardo *et al.* (2013) find that price also plays an important role in Spanish marketing fruit and vegetable cooperatives. Prasertsang *et al.* (2020) prove positive relationships between member satisfaction and farmers' participation, meeting attendance, share investment, and profitability in Thai marketing cooperatives. Furthermore, Grashuis and Cook (2019) confirm positive relationships among commitment, participation, and organizational growth for US cooperatives. Similar results are reached by Donkor and Hejkrlik (2021) in Zambian marketing rice cooperatives.

Five pieces of research combine two or more farmers' performance measures. Four papers combine farmers' financial and efficiency results: Ahado *et al.* (2021), Chagwiza *et al.* (2016), Dong *et al.* (2019), and Verhofstadt and Martens (2014). In particular, Chagwiza *et al.* (2016) find that Ethiopian dairy cooperatives improve farmers' profits because they enhance efficiency through technological innovation, productivity, and prices and conclude that processing and marketing cooperatives facilitate technological innovation and improve commercialization, although they do not offer better prices. Verhofstadt and Martens (2014) also find a positive relationship between cooperative membership and farm revenue in Rwanda. Furthermore, they demonstrate a positive relationship between farm product commercialization and labor productivity.

3.3. Combination

A limited body of literature has investigated the performance of agrifood cooperatives, considering their status as multipurpose organizations. This perspective posits that cooperatives consist of multiple firms, each with distinct objectives and constraints (Soboh *et al.*, 2009). These articles combine performance metrics for cooperatives, encompassing both their individual success and their impact on members. Only ten pieces of research have considered this. Among them, five articles focus on harmonizing cooperative financial ratios with member satisfaction metrics, highlighting the importance of both economic stability and member contentment. Other articles explore dimensions of cooperative performance and the nurturing of cooperatives' social capital.

Khan *et al.* (2016), Liang *et al.* (2015) and Mann and Stoinescu (2020) analyze the relationship between structural/relational social capital and farmers' participation with cooperative financial results (profit growth, sales growth, ROA, and return on sales) for Malaysian, Chinese and Swiss cooperatives, respectively, proving that social capital has a positive effect on economic performance. Xu *et al.* (2018) reach similar results, but they conclude that members' heterogeneity in Chinese cooperatives should also be considered because it negatively influences an increase in revenue. Yu and Nilsson (2018) also present a compelling finding for Chinese cooperatives: they reveal that well-developed social capital plays a significant role in facilitating access to debt and financial leverage.

Lauermann *et al.* (2020) conclude that in Brazil, processing and marketing dairy cooperatives that are better in financial terms (ROA, margin, debt, etc.) are not meeting their membership needs (surpluses per member and members vs. technician presence in the cooperative's government bodies). Marcos-Matas *et al.* (2018) relate members' commitment to Italian cooperatives' innovation and capitalization levels. Their results confirm that committed members enhance innovation and capitalization, which indicates that such commitment could drive the cooperative's welfare. Omar *et al.* (2022) study the catalyst and constraining factors of a Malaysian cooperative's performance measured by managers' perceptions. They find that members' commitment increases performance, whereas uncertainty, risk avoidance, and membership disagreements adversely affect the performance perceived by cooperative managers.

Franken and Cook (2015) design a measure composed of the cooperative's financial indicators (such as ROA, ROE, and EVI) and patrons' satisfaction and vision achievement, proving the existence of positive and significant relationships among financial performance, member satisfaction, and overall performance (measured by cooperative Boards) in US cooperatives. However, these relationships vary according to the type of cooperative: The relationship is stronger in marketing cooperatives than in service cooperatives because, in the former, customer satisfaction is much more closely linked to the price paid for raw materials. Franken and Cook's (2015) measure is used by Iliopoulos *et al.* (2022), who analyze the Estonian agricultural cooperative sector considering the multiobjective nature of these organizations.

4. Discussion

In this section, we will thoroughly assess the addressing of the three proposed research questions, providing a critical view and discussing the strength of the empirical results.

Regarding RQ1, we can classify the performance indicators into two distinct categories based on Soboh's *et al.* (2009) division. The first category encompasses measures that view cooperatives/members as entities with a single objective and focuses on maximizing cooperative/member performance. The second category involves indicators that examine cooperatives from the perspective of having multiple objectives. Assuming that membership interests are aligned, these organizations adopt a dual focus: satisfying the members' needs and maintaining competitiveness to ensure survival. Thus, measures that solely analyze cooperatives or members fail to capture the comprehensive functioning of the organization. A proper measurement lies in those approaches that recognize cooperatives as entities capable of bringing together the achievement of different objectives. These objectives may sometimes conflict, but they all ultimately revolve around the cooperative's survival. Unfortunately, research that simultaneously considers the objectives of both parties is scarce, and only 5.7% of papers in the database fulfill this condition.

First, the availability and comparability of cooperatives' financial indicators justify the high frequency of these studies (more than a third). They consider that cooperatives are organizations that aim to maximize their benefits (ROA, ROS, or profit in pieces of research such as Hernández-Nicolás *et al.* (2015), Marcis *et al.* (2019) and Mozas-Moral *et al.* (2021)). However, cooperatives are horizontal and vertical integration processes, born to prevent the opportunistic behavior of other stages in the supply chain or bring economic balance back under their control (Bijman and Hendrikse, 2003; Cook, 1995). Thus, financial indicators cannot appropriately measure cooperatives' performance because (1) the recipients of the residual rent are the owners, who also happen to be suppliers/customers seeking to obtain a high/low price for their products/supplies, and (2) even though, as productive entities, cooperatives have the objective of obtaining good economic results to continue carrying out their economic activity, the primary objective of these organizations is to meet their members' needs (Benos *et al.*, 2018).

Overall, using financial measures, the literature confirms that internationalization (Heyder *et al.*, 2011; Mozas-Moral *et al.*, 2021) and vertical integration (Mozas-Moral *et al.*, 2021; Zhong *et al.*, 2018) have a positive relationship with the performance of cooperatives. However, there is no consensus on other variables analyzed (i.e. size: Singh *et al.* (2019) vs. Pokharel *et al.* (2019)) and the presence of women on the decision-making team (Chi *et al.*, 2021, vs. Sebhatu *et al.*, 2021)). The lack of consensus may arise from several factors, and arguably the most significant one is that financial indicators do not fully capture whether these organizations are effectively achieving their objectives.

A parallel situation arises when analyzing the efficiency of cooperatives, which is the second indicator in the ranking of frequency of use in the database (16% of papers). Efficiency is a good indicator of a cooperative's performance (Ishak *et al.*, 2020), but there is no agreement about what is regarded as an efficient cooperative, whether cooperatives are efficient enough, or ways of improving such efficiency. Contradictory results also appear here (e.g. size: Othman *et al.* (2014) vs. Caputo and Lynch (1993)).

When the literature uses cooperatives' financial or efficiency results, the ratios predominantly stem from neoclassical theory, which posits that organizations strive to optimize their outcomes, be it financial performance or efficiency. While these analyses offer advantages in terms of comparability and accessibility, they only address a fraction of these organizations' missions, overlooking their primary objective of fulfilling the members' needs. Moreover, many of these studies analyze different types of cooperatives (e.g. marketing, supplying, and processing) collectively without making any distinctions. Out of the 175 articles analyzed in depth, seventy-three of them do not make any reference to the specific type of cooperative they are analyzing (e.g. Kontogeorgos *et al.*, 2018; Liang *et al.*, 2023). This differentiation is highly relevant and would likely lead to variations in the results, as the operational methods and objectives of agents in various cooperatives differ significantly (Alho, 2015). Marketing cooperatives have the primary goal of selling and distributing members' raw materials (Grashuis, 2020a), whereas supply cooperatives provide services and commodities (Pokharel *et al.*, 2019) and processor cooperatives are engaged in value-added of agrifood products (Ferrer *et al.*, 2019). Hence, the competitive and corporate strategies of various types of organizations within the

agrifood sector differ significantly. As a result, the outcomes they achieve can vary, and it is essential to interpret the results with this divergence in mind (Alho, 2015).

Another reason contributing to this lack of consensus is the subsector under analysis. Many studies often group several agrifood subsectors together that may not be directly comparable (Barry and Rousselière, 2022). Various products, such as milk (Zhong *et al.*, 2018), wine (Couderc and Marchini, 2011), and horticulture (Lerman and Parliament, 1990), necessitate distinct additional services and production processes. Furthermore, moving from a traditional or ‘one-step’ production process to a more complex sequential production technology can lead to large differences in observed efficiency (Ahn *et al.*, 2012). Moreover, each product holds a varying potential to increase its added value, leading to considerable fluctuations in the financial performance of cooperatives.

Last, the lack of international samples and comparisons, with only nine multicountry studies (eight European studies), and the frequently reduced sample size make generalization of results difficult. Moreover, most papers establish relationships between variables, not causalities, due to the type of information and data handled.

Among articles examining financial performance and efficiency, there are two noteworthy exceptions that examine cooperatives as multipurpose organizations: D’Amato *et al.* (2022) and Soboh *et al.* (2012). D’Amato *et al.* (2022) employ a novel ratio, known as the “adjusted performance measure,” which is defined as “earnings before interests, taxes, depreciation, and amortization gross the cost of raw materials” (D’Amato *et al.*, 2022; p. 40). It considers the possibility that cooperatives might have low profitability due to paying higher prices for raw materials to their members. To address this, the cost of members’ raw materials is excluded from the function, as it does not align with the maximization objectives. While this ratio may not perfectly isolate all goods and services received by members, it does account for their primary cost. However, the research has an important limitation, as it is only applied to wine cooperatives in Italy (D’Amato *et al.*, 2022). Thus, generalization of results is pendant, and the paper should be replicated in other sectors and countries to guarantee that this performance indicator is appropriate.

For their part, Soboh *et al.* (2012) develop an unbiased efficiency measure that considers two crucial aspects: (i) the obligation of cooperatives to process all the members’ raw materials; and (ii) the incentive for their owners and suppliers to maximize raw material prices. Traditionally, efficiency models define technical efficiency as an optimization problem where outputs expand and inputs contract. However, Soboh *et al.* (2012) demonstrate that taking into account the true objectives of cooperatives leads to improved efficiency results. Nevertheless this article is not exempt from limitations, and two of them have been reiterated in this study: the lack of consideration for the specific food subsector being analyzed and the failure to consider the type of cooperative.

An alternative to the financial or efficiency measures are market indicators and those papers that combine some of the above measures. Market analyses utilize measures such as market share (Grau *et al.*, 2015), quality (Pennerstorfer and Weiss, 2013), value added (Esnard *et al.*, 2017), or reputation (Castilla-Polo *et al.*, 2018). On the one hand, these performance metrics are better suited to the structure of cooperative entities, as they can be comprehended as indicators of the performance of all the links in the production chain quasi-integrated with the creation of the cooperative. However, it is not very common to encounter this type of indicator, and in fact, the literature review has only yielded twelve instances of them. On the other hand, cooperatives’ combination analysis mainly uses financial and efficiency ratios (Skevas and Grashuis, 2020) or market and cooperatives’ financial ratios (Arcas-Lario and Hernández-Espallardo, 2003; Nath and Arrawatia, 2022). These articles suffer from the same limitations described above.

At the far end of the spectrum, we encounter articles that primarily focus on analyzing the performance of cooperatives based on farmers’ financial results (Serra and Davidson, 2021), efficiency (Ma *et al.*, 2018) or satisfaction (Figueiredo and Franco, 2018) indicators. These analyses presuppose that the fundamental

goal of the cooperative is to satisfy the objectives of its members. Despite the apparent contrast between studies analyzing farmers and those studying cooperatives in isolation, both approaches suffer from a common limitation: the failure to consider the multipurpose nature of these organizations. Most articles that examine member outcomes in isolation tend to focus on specific types of cooperatives (Chagwiza *et al.*, 2016; Vandeplass *et al.*, 2013). Furthermore, these studies typically concentrate on a single sector (e.g. corn in Manda *et al.* (2020), or potato in Ahado *et al.* (2021)), and no one is multicountry, which contributes to the perception of more consistent results but lacks the generalization of results.

Out of all the articles available, the ten that combine cooperatives and farmers' performance stand out as the only ones that truly consider the cooperatives' multiobjective condition. These analyses typically amalgamate financial metrics such as ROE, ROA, and profits, along with assessments of social capital and/or member satisfaction (e.g. net profit, market share and members' satisfaction in Sisay *et al.*, 2017). However, there remains room for improvement, as they rely on subjective measures, as exemplified by the measure constructed by Franken and Cook (2015) and replicated by Iliopoulos *et al.* (2022). This subjective nature might introduce biases or inconsistencies in the findings, thereby necessitating further refinement. However, they offer a good approach to a multiobjective analysis. Additionally, many of these studies do not concentrate on a single subsector or cooperative type but instead analyze several sectors and types collectively (e.g. Liang *et al.*, 2015; Yu and Nilsson, 2018). The use of a limited dataset and the lack of generalization also remain shortcomings (Lauerma *et al.*, 2020).

Regarding RQ2, although cooperatives and IOFs are vastly different organizations in terms of objectives, fifty-two articles in the dataset compare them (e.g. López-Bayón *et al.*, 2018; Pennerstorfer and Weiss, 2013) or confront the outcomes of cooperative members with farmers who supply their raw materials to an IOF (e.g. Chagwiza *et al.*, 2016; Manda *et al.*, 2020). The interest in analyzing both types of organizations arises from the fact that they compete in the same markets. However, their organizational functioning is so distinct that, in many cases, these comparisons lack coherence.

The objective of both types of organizations could be summarized as the maximization of owners' benefits. However, unlike IOFs, in cooperatives, the owners are also suppliers/customers of the organization. This implies that cooperative members can be remunerated in various ways, not just through dividends. Consequently, the performance of cooperatives cannot be summarized by the ROA (e.g. Chen *et al.*, 2017) or ROE (e.g. Ferrer *et al.* 2019) or even by efficiency ratios aimed at maximizing output while minimizing input. Therefore, analyses such as Martínez-Victoria *et al.* (2018) or Montero and Pacheco (2018), which utilize technical efficiency and profitability, lack meaningful significance, as they exclusively rely on ratios that do not indicate whether the cooperative is genuinely satisfying the needs of its members. Moreover, they overlook the extraordinary costs incurred by the organization in its pursuit of meeting its objectives.

Another group of articles compares the results obtained by farmers who supply raw materials to IOFs with others who are cooperative suppliers (e.g. Ma *et al.*, 2018; Serra and Davidson, 2021). These pieces of research aim to verify whether cooperatives and IOFs meet the needs of their suppliers. However, since cooperatives are founded with that specific objective, whereas IOFs are not, the results of these comparisons are biased.

This problem is overcome by D'Amato *et al.* (2022) and Soboh *et al.* (2012), as they conduct financial and efficiency analyses (respectively) while accounting for the costs of raw materials in both cases, as previously described. While these two articles employ different metrics, they arrive at a common conclusion: despite distinct objectives between IOFs and cooperatives, both organizational types are profitable, and their "adjusted" results are comparable. Thus, they reveal a consensus not found in the rest of the literature comparing these two organizational types.

The review elucidates the weight that the literature on cooperatives' performance has given to governance and ownership innovations (RQ3). Cook (1995) and Chaddad and Cook (2004) underline that cooperatives

need to change to survive rapid market evolutions. They explain how cooperatives have implemented structural modifications to overcome their limitations (related to property rights distribution, residual return allocation, and rapid market changes). Because of these modifications, new cooperation models have arisen (Grashuis and Cook, 2017), and “traditional” cooperatives coexist with “new” ones (Chaddad and Cook, 2004; Cook and Chaddad, 2004).

Sixteen papers in the dataset study this topic, with none combining cooperative and farmers’ performance measures and 56% employing financial or efficiency indicators that replicate the problems indicated when discussing RQ1: disparate results can be found (e.g. Meliá-Martí *et al.* (2017) vs. Bijman *et al.* (2013)), different types of cooperatives are analyzed collectively (e.g. Kontogeorgos *et al.*, 2018), several food subsectors that are not directly comparable are grouped together (e.g. Kalogeras *et al.*, 2013), or there are no international comparisons and limited scope (e.g. Couderc and Marchini, 2011).

Four papers analyze the impact of governance innovations on market indicators, pointing to a positive relationship (e.g. Benos *et al.*, 2016), but no generalization is possible because except for Esnard *et al.* (2017), who analyze Saint Lucia marketing cooperatives, all of them study cooperatives operating in Europe. Furthermore, only one combines indicators, Kyriakopoulos *et al.* (2004), who conclude that organizational innovations have adverse effects on the performance of supply and marketing cooperatives (measured as a construct composed of market share, profit margin, and growth of the cooperative firm). They combine financial and market indicators that exacerbate the problem related to financial measures. Two remaining papers evaluate organizational innovations from the perspective of farmers (Alho, 2015; Singh, 2023), and they reach disparate results.

In summary, papers considering the effect of governance and ownership innovations on performance are still scarce. Furthermore, consensus has yet to be reached on the varied and increasingly frequent effects of these innovations. Work should be done to identify the actual consequences of these processes, not only in terms of size or financial ratios, but also adopting a multiobjective perspective and including other variables that measure the effectiveness of the new organization in meeting its objectives.

5. Conclusions

Over the years, there have been diverse approaches to measuring cooperatives’ performance. This is not a trivial matter because, if anything, they are characterized by a high survival rate and longevity, underpinning the idea that their performance is, at the very least, acceptable. However, there seems to be no agreement on how to measure it, compare their performance with that of other types of organizations, or even compare cooperatives that have implemented organizational innovations with those that have not.

Papers based on the individual results of either cooperatives or farmers predominate, although they conceive cooperatives as single-objective organizations. A similar situation was reported in the review by Soboh *et al.* (2009). Hence, these articles possess a substantial limitation: they do not acknowledge that cooperatives are multiobjective organizations. Although rare, some papers have attempted to measure cooperatives’ performance considering their multipurpose feature (e.g. Yu and Nilsson, 2018). However, many combine financial and efficiency ratios with subjective measures (e.g. Franken and Cook, 2015), such as members’ satisfaction or commitment. While not perfect, such studies provide a more realistic insight into how well these organizations meet their objectives.

Furthermore, the problems with the indicators used are further exacerbated when comparing cooperatives and other types of organizations, mainly IOFs. Although not a predominant trend, more than a third of the articles reviewed compare the results of these two types of organizations or the outcomes for farmers supplying cooperatives versus those who supply their raw materials to IOFs. Comparisons are usually based on purely financial or efficiency indicators without considering their fundamentally different objectives. This

diminishes the relevance of the obtained results. Therefore, except for the analyses by D'Amato *et al.* (2022) and Soboh *et al.* (2012), these comparisons are not suitable because they overlook the fact that the objective of the cooperative is not solely profit maximization, and IOFs do not seek to maximize their suppliers' performance. While it is true that they compare two organizational types competing for the same customers, their objectives and governance mechanisms are completely distinct. Consequently, their performance should also be gauged through alternative indicators.

Finally, while several authors have emphasized the importance of governance and ownership innovations and many agricultural cooperatives worldwide have adopted them, it is not common to consider their effects on performance. Furthermore, consensus has yet to be reached on the effects of these innovations. Given the frequency and the variety of these changes, further investigation is needed to comprehend the implications both for the cooperative and the farmers involved. Work should be done to identify the real consequences of these processes, not only in terms of the cooperative's size or financial ratios but also by adopting a multiobjective perspective, including variables related to farmers' performance. We are not aware of any paper that has thus far done so.

Moreover, it would be beneficial to consider the type of cooperative being analyzed, as it influences its operational dynamics, as well as sector and country-specific factors, to ensure the generalizability of the findings. Although this literature review did not delve into the cultural and economic contexts of the analyzed samples, future research endeavors should acknowledge the significance of the country. Varying regulations across different regions may have an impact on the outcomes and restrict the generalizability of the findings. The literature examining the performance of agrifood cooperatives also requires an effort to refine methodologies to try to determine causalities.

In summary, after conducting an in-depth review of the literature, our research has revealed the need for investigation considering the multiobjective feature of cooperatives and important room for development on this topic. The current literature on cooperative performance focuses mainly on partial measures, such as financial indicators. Consequently, the findings have been inconclusive and inaccurate, particularly when comparing cooperatives with other organizational forms, mainly IOFs. Accurately measuring cooperatives' performance is also crucial to evaluating the effects of organizational innovations. We recognize that some of these limitations are challenging and do not detract from the merit of much of the research carried out in this area.

The misunderstanding of cooperatives as single-objective organizations could also affect policymakers, managers, and BoDs. The former, when developing and evaluating policies, should consider their impact not only on the own cooperatives' indicators but also on members-farmers' performance. Managers and BoDs should implement organizational routines to collect and analyze information not only on cooperative performance indicators but also on members' performance indicators, for example, their satisfaction and financial results. Measuring only the performance of the cooperative itself, which is done in almost all cases, may hide valuable information that may call into question the viability of the organization. It is a challenging task but necessary to guarantee the long-term competitiveness of the cooperative. By considering the dual objectives of cooperatives when gauging their performance, stakeholders could better understand the unique benefits and challenges associated with these organizations and could precisely evaluate how they operate in markets.

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