Measuring Agricultural Cooperative Performance: Trends, Sectoral and Geographical Association

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Abstract

There is increasing interest in the performance of agricultural cooperatives. However, there is little consensus on what measures are most appropriate to use. Despite this, to date, there are no studies that review the literature on agricultural cooperative performance to establish how the most used performance measures have evolved over time and any relationship between the sectors and locations of agricultural cooperatives. Thus, this paper seeks to address this gap by (i) identifying the foremost measures that have been used to evaluate the performance of agricultural cooperatives; and (ii) exploring the trends, sectoral and geographical association with the use of these performance measures. A multistage analytical framework, comprising a journal article network analysis and a qualitative meta-analysis is used to extract relevant information from 124 journal articles and perform content analysis. Subsequently, a non-parametric test is used to examine the association between the year of publication, sector and geographical location of agricultural cooperatives and the performance measures. The results show a significant increase in the use of liquidity indicators in more recent publications. There exists a significant association between the sector of the agricultural cooperative and the most used performance measures but no association with the geographical location.

Keywords: agricultural cooperatives; performance; network analysis, qualitative meta-analyses

1. Introduction

Cooperative performance is a complex and ambiguous construct that is open to multiple interpretations (Grashius & Su, 2019; Soboh et al., 2009). Furthermore, there is no consensus on what measures are most appropriate to use to evaluate cooperative performance (Benos et al., 2016; Soboh et al., 2009). Cooperatives are a unique form of organisational structure where the members[1] are the owners of the organisation as well as suppliers or users of its products and services. In contrast to investor-owned firms (IOFs), cooperative members "contribute equitably to, and democratically control, the capital of their cooperative" (International Cooperative Alliance [ICA], 2017 p. 29). Cooperatives also adhere to certain values and principles including a commitment to social and environmental sustainability (ICA, 2017; Luo et al., 2020). These attributes generate specific characteristics, where profit maximisation and return on capital are not necessarily the organisation's primary goals, nor are they the only way to benefit its owners (Soboh, Lansink, Giesen, & van Dijk, 2009; Sykuta & Cook, 2001). Consequently, conventional methods of evaluating business performance are not necessarily adequate (Benos et al., 2016; Hirsch & Hartmann, 2014).

Agricultural cooperatives are a subset of cooperative organisations and are owned by producers who transact with the cooperative in agri-food products or inputs. They make up a significant portion of cooperative organisations comprising 32% of the world's top 300 cooperatives[2] (World Cooperative Monitor, 2022). Though agricultural cooperatives are similar in structure to other cooperatives, they have some distinct characteristics arising from the biological nature of agricultural processes and products. These include factors such as perishability, variable quality and yield, seasonality, in addition to the impact of weather, pests, and other environmental risks (Grimm et al., 2014; Van der Vorst et al., 2002). Furthermore, there is added complexity due to issues such as food safety, environmental sustainability and ethical concerns that are important to stakeholders and consumers (Beske et al., 2014; Govindan, 2018; Matopoulos et al., 2007; Rábade & Alfaro, 2006; Rueda et al., 2017). As a result, evaluating the performance of agricultural cooperatives has some unique challenges.

There is growing interest in the performance of agricultural cooperatives. This is shown by a rapid increase in publications and citations on this topic (Luo et al., 2020). Two recent reviews of the literature on agricultural cooperatives by Grashius and Su, (2019) and Luo et al. (2020) identify

[1] A "member" can be a person or legal entity who owns and transacts with a cooperative.

[2] Measured by turnover $US

agricultural cooperative performance as an important topic within the literature. According to Kalogeras et al. (2013), the empirical analysis of agricultural cooperative performance can be broadly grouped into two categories – (i) *economic efficiency-related indicators and* (ii) *financial ratios.*

Of these two, most studies use the financial analytical lens (Ajates, 2020; Benos et al., 2016; Franken & Cook, 2015). This perspective emphasises short-term accounting measures like Return on Assets (ROA), Return on Equity (ROE), Return on Sales (ROS) and liquidity measures (Claver et al., 2007; Grashius, 2019). The use of financial indicators are also frequently used to compare the performance of cooperatives with IOFs. The second approach focuses on operational performance and uses economic efficiency measures such as technical, productive, cost, and allocative efficiencies (Bartova & Fandel, 2020; Franken & Cook, 2013; Pokharel & Featherstone, 2019; Skevas & Grashuis, 2020).

These approaches have been shown to have significant shortcoming. Firstly, the reliance on financial measures is criticised due to a lack of theoretical justification. Secondly, the use economic efficiency measures have been challenged because of their reliance on econometric analysis which is based on the narrow assumptions of neoclassical economic theory (Slade & Hailu, 2016). Both these approaches are unable to evaluate non-financial measures of performance (Franken & Cook, 2013; Benos et al., 2016). This means they do not capture the relational, social, and environmental aspects of agricultural cooperatives (Claver et al., 2007). To include the relational aspects, some studies use subjective measures such as cooperative members' satisfaction and social capital (Hakelius, 2018; Lajara-Camilleri & Server-Izquierdo, 2017). In recent years there has been an increasing emphasis on Sustainable Business Models (SBM), Corporate Social Responsibility (CSR) and analysis of Triple Bottom Line(Fiore, Galati, Gołębiewski, & Drejerska, 2020). Consequently, a focus on the social and environmental sustainability principles of cooperatives. For example, Luo et al. (2020 p.7) state that western agricultural cooperatives have "always emphasised social and environmental performance". Despite this, it is not evident how these non-financial aspects are being measured or whether more recent literature has addressed these questions. Hence, it is important to establish whether the measures that have been used to assess the performance of agricultural cooperatives have evolved over time in response to these contemporary issues.

Research on cooperative performance is carried out in a wide range of geographical locations and within different agricultural sectors (*Appendix A in supplementary material*). Although the effect of these attributes has been reported, there is currently no empirical evidence to establish if these differences affect the type of performance measurement used. Some studies identify geographical differences in the characteristics of agricultural cooperatives (Bijman & Iliopoulos 2014; Pokharel, Archer, & Featherstone, 2020; Brusselaers et al., 2014). It is not clear, however, if the choice of

93 performance measures is associated with these. Many studies use a variety of performance measures
94 with no consistent rationale as to the selection of specific measures relevant to specific geographical
95 contexts (Benos et al., 2018). Therefore, establishing the association between performance measures
96 and geographical region will identify if there are patterns in the use of specific indicators.
97 Many studies on the performance of agricultural cooperatives focus on a specific sector of
98 agricultural production. The most common sectors are dairy, grain, and horticultural cooperatives
99 though some evaluate the performance of cooperatives across multiple sectors (Appendix A).
100 Sectorial differences in the performance of cooperatives have been linked to the perishability of
101 different agricultural products (Bijman & Iliopoulos, 2014). According to Lerman and Parliament
102 (1991), the differences in the operations of the agricultural cooperatives determine the type of
103 performance measures that are relevant. Therefore, it is important to establish if specific performance
104 measures are associated with sectors involving different agricultural products. The evolution of
105 performance measures over time, their association with different sectors of agricultural production
106 and geographical location represents a significant research gap. Evaluating these associations can
107 identify where there may be an overemphasis on certain measures and can encourage the use of
108 measures that can better capture the multidimensional objectives of cooperatives. This is especially
109 important regarding the social and environmental aspects of cooperatives.
110 Therefore, the purpose of this paper is to examine the type of measures used to evaluate the
111 performance of western agricultural cooperatives and explore the association of these measures with
112 the year of publication, the sector within which they operate, and the geographical location.
113 Specifically, this paper seeks to answer these research questions:
114 *(i) What measures are used to evaluate agricultural cooperatives' performance?*
115 *(ii) Have the use and type of performance measures evolved over time?*
116 *(iii) Are there differences in the type of performance measure used in different sectors and*
117 *geographical locations?*
118 The remaining sections of the paper are segmented as follows: Section 2 covers the methodology
119 used in this paper. This section entails a description of the Journal Article Network Analysis (JANA),
120 which is used to extract relevant literature for the qualitative meta-analysis and quantitative analysis.
121 The results are presented and discussed in Section 3, and the conclusions drawn from the findings are
122 presented in Section 4.

2. Methodology

A multistage analytical framework, presented in Fig. 1, is used to examine the trends of agricultural cooperatives' performance measurement, and establish the sectoral and geographical differences in the measures that have been used to assess agricultural cooperative performance. The first stage focuses on the use of Journal Article Network Analysis (Aboah & Lees, 2020) to identify relevant literature from selected databases. The second stage involves a qualitative meta-analysis and a content analysis of various themes to extract relevant data for quantitative synthesis of the sectoral and geographical trends of measuring the performance of agricultural cooperatives in the third stage. The procedures involved at each stage of the analytical framework are detailed in the succeeding sub-section.

{Insert Fig 1 near here}

2.1 Stage 1 – Journal Article Network Analysis

A Journal Article Network Analysis (JANA) is developed to collate relevant literature for the qualitative meta-analysis. This methodology improves the replicability of a systematic literature review, prevents the loss of essential data, and predetermination and exclusion of significant journal articles. The main advantage that JANA has over the use of citation analysis (Luo et al., 2020) is that citation analysis by default favours articles with old publication dates due to the focus on the number of citations, while JANA deals with the thematic network incorporating information from title, keywords and abstract (Aboah et al., 2019). Thus, with JANA, newly published journal articles that are strongly thematically connected with articles with older publication dates are included in the analysis.

The JANA involves four steps for the article selection (Aboah & Lees, 2020). The first step is database selection. The selection of database(s) is important to ensure the inclusion of all relevant articles. In contrast to a recently published literature review (Luo et al., 2020) which only used the Scopus database, this paper, used two databases, Scopus, and Web of Science to ensure article inclusion. The second step involves the use of a different combination of Boolean search strings to find relevant journal articles. A broad Boolean search string was designed to avoid excluding important information. The search string used contained three groups of terms:

(i) agriculture, agribusiness, farmer, agri, agro, or food*

(ii) cooperative, co-operative, producer organization, coop, or co-op

(iii) performance, efficiency, financial, social, environment or sustainab*.*

The terms were joined within groups with "OR" Boolean operators, and between groups with "AND" Boolean operators. In other words, an article to be selected needed at least one of each group of terms. The search engines included the results matching the selected terms and disregarded if the spelling was British or American. The searches targeted the title, abstract and keyword sections for the Scopus database and the topic section for the web of science. The review limited the search criteria to peer-reviewed articles published without a restriction on the timeline. Articles in English, Spanish and Portuguese were selected, due to the capabilities of the authors. The Boolean string resulted in 2,138 articles from the Web of Science and 4,414 documents from the Scopus database. The publication years for the extracted preliminary papers range from 1937 to 2020.

The third step involves a calculation of the link strength of the articles extracted in the preliminary search, using the information from the title, keywords, DOI, abstract and citation links. The link strength is based on the similarity of keywords, topics and the themes addressed in each article. So closely linked articles will generally discuss similar issues (in this case, agricultural cooperative performance). The Vosviewer® software processes the common information among journal articles and selects closely linked articles based on two conditions. Articles that are published in later years are connected to those published earlier but not the reverse. Thus, one condition is that the links between the two articles are logically forward-looking. Another condition, which is a variant of the first, is that publication links are acyclic, meaning that two given publications cannot cite themselves mutually (Van Eck & Waltman, 2014). The minimum threshold for selecting an article was set to zero links because articles with recent publication dates have lower link strength. Therefore, if an article had at least one link with the existing literature, it was included in the analysis; otherwise, if no link was present, it was excluded. A link between two journal articles, A and B is presented as a directed connection (A →B), where A and B are articles published in later and earlier dates.

The JANA groups strongly linked articles into the same cluster based on the article's subject or theme using the articles key words. Different colours are used to distinguish the clusters. The minimum number of articles that can form a cluster was set to five. The size of the cluster circle in the JANA represents the number of other articles that are connected to it. The larger the circle size, the more article connections. The search selected all those articles that had at least one link between them. The refined search resulted in the selection of 699 closely linked articles for Web of Science, and 399 for Scopus as shown in Fig. 2 and 3, respectively.

{Insert Fig. 2 and 3 near here}

The fourth step involved merging duplicate articles (articles found in both databases) to estimate total link strength ($Ls_{(total)}$) for closely linked articles selected from the JANA as presented in eq. 1.

$$Ls_{(total)} = L_{w(i)} X_{w(i)} + L_{s(i)} X_{s(i)} \quad (1)$$

$L_{w \text{ and }} L_s$ are the link strength in the JANA database from the Web of Science and Scopus databases, respectively. If a publication appeared in the JANA for the Web of Science, then $X_{w(i)} = 1$, else ($X_{w(i)} = 0$. Likewise, if a publication appeared in JANA for Scopus, then $X_{s(i)} = 1$, else $X_{s(i)} = 0$. After merging duplicate articles, it resulted in a list of 745 closely connected articles. A trend of these articles, presented in Fig. 4, highlights the increasing interest in measuring the performance of agricultural cooperatives after 2013.

{insert Fig 4 near here}

The contents of the 745 articles were carefully analysed, using the inclusion and exclusion criteria, presented in Table 1. The most common exclusion reasons were related to articles that were not; focused on western developed countries, written in the specified languages, directly related to agricultural cooperative performance.

{Insert Table 1 near here}

2.2 Stage 2: Qualitative Meta-Analysis

After merging and applying the inclusion and exclusion criteria, 124 strongly connected articles (Fig. 5) that analysed the performance of agricultural cooperatives in developed countries were selected for the qualitative meta-analysis. The average link strength of the selected articles is 13.2. The minimum and maximum link strengths were 1 and 98, respectively. Furthermore, 57 out of the total selected articles had a link strength of more than 10. The link strengths of all the selected articles are presented in **Error! Reference source not found.**of the supplementary file. The selected articles were ranked in order of link strength, and the topmost articles were selected for the qualitative meta-analysis; all articles with a link strength greater than or equal to 1 were selected for the qualitative meta-analysis.

{Insert Fig 5 near here}

For the qualitative meta-analysis, the following data were extracted from the selected articles: authors, journals, year of publication, geographic location, theoretical lens, methodology, objectives, sample, sector, period analysed, performance measures, antecedents, classification of measures,

cooperative structure, and the key findings[3]. Thereafter, the year of publication, the sector and geographic location of the articles were used to determine if any relationship was present between these characteristics and the used performance measures. In the 124 articles selected, 14 sectors were identified as the subject of analysis. These sectors include grains, dairy, fruits and vegetables, wine, cotton, organic products, bioethanol, olive, animal feed supply, alpine products, forestry, meat, lamb, and supply cooperatives. Some articles focused on one sector, while others investigated a few or many of them. Regarding geographic location, the 124 articles were classified into 23 categories. Those categories corresponded with the individual countries of the selected regions (North America, Europe, and Oceania), and different combinations of those countries and regions. The performance measures, sector and geographic locations were coded as nominal measures to facilitate the quantitative analysis.

2.3 Stage 3: Quantitative Analysis

The Pearson's Chi-Square test was used to determine whether there is an association between the sector of the cooperative and the indicators that are mostly used for measuring the performance of agricultural cooperatives. The Pearson's Chi-Square test is estimated as:

$$\kappa^2 = \sum [(O_{ij} - E_{ij})^2/E_{ij}] \quad (2)$$

Where O_{ij} *and* E_{ij} are the observed and expected frequencies, respectively; *i and j* are the indexes for the rows and columns of a contingency table. A similar test was performed for the study area, the year that the study was published and the indicators that are mostly used to measure the performance of cooperatives. The null hypothesis for the Pearson's Chi-Square test (H_0) is that the sector of an agricultural cooperative, the study area where the research was conducted, and the year in which the study was conducted are independent (no association) of the indicator mostly used for measuring the performance of the cooperative. The Cramer's V is used as the test statistic to determine the strength of association when the Pearson's Chi-Square test is statistically significant. Cramer's V ranges from 0 to 1; with < 0.3 being weak association, between 0.4 to 0.5 been moderate association, and > 0.5 been strong association.

[3] Generally, articles that propose conceptual frameworks have high link strength because other articles build on these frameworks. However, such articles are not relevant for this study's content analysis, which is a post-JANA step to extract data points for the quantitative analysis.

3. Results and Discussion

Two key results are presented and discussed in this section. The first part shows the trends in the use of performance measures and how they are classified. The year of publication is used as the basis for capturing the trends of performance measures. The next section covers the tests used to establish the association between the study areas, the sector they operate in, and the use of performance measures. The results are based on the findings of 124 peer-reviewed journal articles selected from the Journal Article Network Analysis that focused on agricultural cooperative performance. Out of the total, 63 used panel data, 42 used cross-sectional data, and 19 were theoretical studies. The average number of years for the studies involving the use of panel data is 9.5 years.

3.1 Trend of Performance Measures

Error! Reference source not found. summarises the top 20 most frequently used indicators for measuring agricultural cooperative performance. The results show a diverse list of indicators and a lack of consistency in their application. From 124 articles retrieved from the network analysis a total of 53 different performance indicators are identified (refer to supplementary materials for details). Analysis of the top ten most used indicators can be segmented as financial measures, self-evaluation measures, technical efficiency measures, market-related measures, and social-related measures.

{Insert Table 2 near here}

The findings show that agricultural cooperative performance has mostly been measured using financial indicators presented (**Error! Reference source not found.**). Specifically, measures of liquidity (i.e., current ratio and acid test) are the most frequently used indicators of performance. The return on assets (ROA) is the second most used financial indicator for assessing agricultural cooperative performance. The dominant use of liquidity indicators to measure performance suggests that more attention has been paid to the short-term performance of agricultural cooperatives. In most cases the liquid indicators are used with other financial indicators such as ROA, however, measures of liquidly are consistently used with a range of other financial indicators.

Error! Reference source not found. shows the cumulative trend of the four most used performance measures. This graph is in line with the analysis presented in Table 2. It identifies that the two financial ratios; liquidity (current ratio/acid ratio, cashflow) and return on assets have consistently been the most frequently used measures of performance since 1993. The economic efficiency measures (Technical scale and allocative efficiency) and the qualitative measure of membership satisfaction have had a similar use over this period. The dominant use of financial measures assumes that agricultural

cooperatives are somehow like IOFs and can be measured in the same way. It is worth noting that some of the financial indicators that measure the benefits to cooperative members (for instance, premium price or satisfaction) acknowledge the differences between cooperatives and IOFs. However, their usage is lower. Furthermore, measures that focus on the external performance of agricultural cooperatives, which do not directly benefit members have not been often used.

{Insert Fig. 7 near here}

Error! Reference source not found. shows the measures of performance classified into four groups: economic, relational, social, and environmental. Economic performance includes measures that are related to financial analysis, or economic efficiency (Benos et al., 2018). Relational performance refers to measures of the interrelationship between the members of the cooperative or members with the cooperative. These aspects are commonly incorporated into the social capital model (Nilsson et al., 2012). The social performance classification refers to measures that reflect the relationship of the cooperative with those who are not members of the cooperative.

These include suppliers to IOF's or related competitor organisations, other supply chain participants wider society and stakeholders (Chloupkova, Svendsen & Svendsen, 2003; Luo et al., 2020; Ortiz-Miranda, Moreno-Perez & Moragues-Faus, 2010). Finally, environmental performance includes the impacts and the interrelation of the cooperative and its members with the natural environment. (Claver et al., 2007; Melia-Marti, Tormo-Carbo & Julia-Igual, 2020; Baranchenko & Oglethorpe, 2012).

The results support three main conclusions. Firstly, they confirm that economic measures have dominated the literature on cooperative performance (**Error! Reference source not found.**). Therefore, supporting the observations of Ajates (2020) and Claver et al. (2007) who state that most of the literature on the performance of agricultural cooperatives uses an economic lens. Secondly, the results also indicate that though the economic perspective dominates the literature, there is some attention paid to member benefits from a social perspective (Feng, Friis, & Nilsson, 2016; Benos et al., 2016). Finally, the results highlight the lack of studies that focus on the external social and environmental measures of performance. Even when social, environmental measures are used most of these studies still include economic performance criteria. This emphasis ignores a fundamental principle of cooperatives which is to "work towards the sustainable development of their communities" (ICA, 2017 p85). This statement implies that cooperatives by nature provide benefits beyond their members and involve both economic and social outcomes. From a financial performance and economic efficiency perspective, these external benefits are viewed as a weakness of cooperatives and are described in the literature as the external free-rider problem (Iliopoulos & Cook, 1999; Ortmann & King, 2007). In contrast to this view these wider benefits can be seen as positive spill-over effects (Galdeano-Gómez, 2008; Galdeano-Gómez, Céspedes-Lorente, &

Martinez-del-Rio, 2008). For example agricultural cooperatives can benefiting non-members through being price leaders and through stabilisation of prices (Soboh et al., 2009).

The results of the test of association indicate a statistically significant association (p-value < 0.05) between the use of liquidity indicators and the year in which the studies were conducted (**Error! Reference source not found.**). The test of the strength of association, evidenced by Cramer's V of 0.58, signifies a strong association between the use of liquidity indicators and the study year. This demonstrates an increasing trend in the use of these indicators. No statistically significant association is reported for the other indicators in the analysis. This shows there has been no substantial increase in the use of non-financial measures. Significantly, it highlights a neglect in the use of indicators that capture the benefits to members and the external environmental and social impacts of agricultural cooperatives' activities (operations).

{Insert Table 3 near here}

The use of subjective or objective measures for measuring performance has been linked to the type of data used in a study. Primary data often links with subjective measures while secondary data allows for the use of objective measures (Murphy et al., 1996). Benos et al. (2016) explain the predominant use of financial measures to be due to advantages in terms of the ease of access to secondary data from financial reports and the ability to compare objective measures across different organisations.

3.2 Sectoral Test of Association with Performance Measures

Results of the sectoral association with the use of the performance measures is presented in **Error! Reference source not found.**. This shows a statistically significant association (p-value < 0.05) between the classification of measures and the performance indicators. Also, the results indicate that the classification of the measures has a moderate association with the sector of the cooperative, as evidenced by the 0.49 Cramér's V.

Disaggregating the results reveals that indicators for measuring performance classified under economic measures are the most used measures across all the sectors. The indicators classified under the social-relational measures were the second most used. Out of the 16 different sectors identified in all the selected journal articles, two groups of the sectors (i.e., *(i)* mixed sector comprising fruits, vegetables, and dairy, and *(ii)* grains only used exclusively economic measures (100%). For studies that focused on wine and dairy cooperative sectors, 81% and 75% used economic measures, respectively. Studies that focus on organic-only and bio-ethanol cooperatives did not consider economic measures as crucial for measuring cooperative performance. The studies that focused on these sectors predominantly used social-relational measures for assessing cooperative performance.

{Insert Table 4 near here}

Narrowing the analysis to the specific performance measures, the test results show that there was no statistically significant association between the use of financial measures (i.e., liquidity indicators and return on assets) as indicators for performance and the sectors of the cooperative. Moreover, the results in **Error! Reference source not found.** show a statistically significant association (p-value < 0.05) between the use of membership voluntary activities (members' involvement, commitment, loyalty) as a performance measure and the sector of the agricultural cooperative. Specifically, the results suggest that studies that focused on cooperatives for different agricultural commodities predominantly used membership voluntary activities as a measure of cooperative performance. The Cramer's V (0.5176) indicates a strong association between the use of membership voluntary activities as a performance measure and the sector of an agricultural cooperative.

Additionally, the results show a statistically significant association (p-value < 0.05) between the use of technical and scale efficiency as a cooperative performance measure and the sector of the cooperative. Cramer's V indicates a medium association between the use of these measures and the sector of an agricultural cooperative. In particular, studies that focused on various sectors such as fruits and vegetable cooperatives and dairy cooperatives use technical and scale efficiency as a measure for cooperative performance. According to Franken and Cook (2015), a difference exists in the indicator for measuring performance (e.g., Return on equity) for dairy cooperatives, IOFs, and grains cooperatives. Also, although dairy, fruits and vegetable cooperatives may outperform IOFs when liquidity measures are used, there was no significant difference when the return on equity is used (Franken & Cook, 2015).

3.3 Geographical Test of Association with Performance Measures

The study geographical location of the studies were tested to determine their association with the performance measures. The results indicate that there is no statistically significant association between the most used performance indicators and the geographical area where the studies were conducted (**Error! Reference source not found.**). This implies that the use of a performance indicator cannot be tied to a particular geography. However, the test results in **Error! Reference source not found.** show a statistically significant association between the performance measures and the study area when the performance indicators are grouped into their respective classifications.

{Insert Table 5 near here}

The distribution of the different study areas where the journal articles included in this paper focused show that most of the journal articles assessed the performance of agricultural cooperatives in the United States (26%); followed by Spain (23%), the world (12%), and aggregation of European

cooperatives (9%). Indeed, for all the study areas, performance indicators that are classified as economic measures were the most used measures (68%); followed by social-relational measures (6.5%), economic-social-relational measures (4.8%), social measures (4.8%), and economic-relational measures (4.8%). The environmental measures were used as an exclusive measure in 1.6% of all the journal articles. Measures that focused holistically on the sustainability of agricultural cooperatives activities (i.e., economic-environmental-social measures) were the least used. This shows that the positive spill-over effects of societal benefits of agricultural cooperatives are rarely evaluated in terms of cooperative performance. There are some attempts to include sustainability measures; however, the operationalisation of environmental performance is varied in the literature (Claver et al., 2007).

4. Conclusions

This paper examines the most important measures used to evaluate the performance of agricultural cooperatives, and explore the trends, sectoral and geographical association in western developed countries. The findings highlight a disparate list of indicators used in the literature. However, there is a dominant use of short-term economic measures. Although the institutional differences between IOFs and cooperatives are consistently acknowledged in the literature, this distinction is not reflecting the performance measures used. In line with the findings of Benos et al. (2018), this paper revealed that a large proportion of the economically-focused literature uses financial indicators (Franken & Cook, 2015). Some of the reviewed articles did in fact incorporate other measures that highlight the dual owner-patron nature of agricultural cooperatives (e.g., premium price), including Frick (2017), Grashuis and Magner (2018), and Melia-Marti and Martinez-Garcia (2015). Nevertheless, their use is not generalised. This highlights the need for more research on performance measures that can capture the non-financial benefits of cooperatives.

This study provides evidence that there is a neglect of the measures that reflect the benefits of cooperatives to non-members, other stakeholders, and the natural environment. In particular, the findings reveal a neglect of environmental measures in existing studies. This is despite the growing awareness of the impact of agriculture on the natural environment (Baranchenko & Oglethorpe, 2012; Willet et al., 2019) and a focus on sustainable business models (Fiore, et al., 2020). This concern does not seem to be reflected in the studies on the performance of agricultural cooperatives in western countries. These findings do not support the research of Luo et al. (2020), who state in their literature review that social and environmental performance is the second largest theme in the studies of agricultural cooperatives.

Likewise, there is a lack of measures that reflect the spillover effects of cooperatives on non-members. Few studies have included the effect of external stakeholders in the performance of agricultural cooperatives (Fiore, Galati, Gołębiewski, & Drejerska, 2020). While the effect of communities' characteristics on cooperatives has received some level of attention in the cooperative literature, the positive benefit of cooperatives on the community, has received less attention. Some exceptions include the work of Figueiredo and Franco (2018) in Portugal and Gallego-Bono and Chaves-Avila (2020) in Spain. In contrast, the effect of cooperatives on the community has received significant attention in developing-countries-based studies (Bernard & Spielman, 2009; Esnard, Lyne, & Old, 2017; Wossen et al., 2017). Therefore, there is a need for future studies to explore the spillover effects of cooperatives on their communities.

A strong, statistically significant association has been established between the use of liquidity indicators and the year in which the study was conducted. Conversely, there is no statistically significant association between the most used performance indicators and the geographical area where the studies were conducted. Thus, the use of a performance indicator cannot be tied to a particular geography. On the other hand, there is a moderate statistically significant association between the sector of the agricultural cooperative and the performance measures used. Studies that focused on organic and bio-ethanol cooperatives did not consider economic measures as crucial for assessing performance; the emphasis is given to social-relational measures.

This paper offers several important contributions to the literature on the performance of agricultural cooperatives. Firstly, the JANA analysis establishes a replicable framework to evaluate the literature on the measurement of agricultural cooperative performance. Secondly, though there are several pre-existing literature reviews on agricultural cooperatives these have a different focus from this review. For example, Marcis, et al. (2019) focus on sustainability performance, Luo et al., (2020) on research themes and Grahuis & Su, (2019) on the empirical analysis of cooperative performance as an outcome variable[4]. This review is the first to specifically address the broad topic of western agricultural cooperative performance and empirically evaluate the trends in the use of performance measures and associations with different sectors and geographical locations.

Thirdly, this analysis identifies the multiplicity of indicators used to measure this construct. It also provides empirical evidence of the dominant use of economic indicators. Consequently, the lack of emphasis on measures that evaluate the impact of agricultural cooperatives on non-members, communities, and the natural environment. These are important findings given the assertion the cooperatives by nature have a commitment to social and environmental sustainability (ICA, 2017) and that western agricultural cooperatives have always emphasised social and environmental performance (Gallardo-Vázquez et al., 2014; Luo et al., 2020; Marcis et al., 2019).

This study reveals several gaps and opportunities for future research. Firstly, there needs to be a significant shift from the dominate use of economic indicators and comparing performance on these measures to IOF. Future research must address this imbalance and identify indicators that measure the social and environmental performance of cooperatives. This can then provide a basis to compare cooperatives with IOFs on these dimensions. In relation to this, the reliance on available secondary

[4] (Grahuis & Su, 2019) evaluate both western and developing world cooperatives with a significant weighting towards non-western cooperatives.

448 data should be addressed. In particular the analysis of published financial reports. Secondly, more
449 research is required to identify which indicators are more relevant to specific sectors and geographical
450 locations. Finally, research should address the limited focus on theoretical frameworks for
451 conceptualising cooperative performance.

452 This research highly relevant to managers and policy makers. With the current concerns of the
453 environmental impact of agriculture, it is important to know the relative performance of cooperatives
454 to other organisational structures. If cooperatives provide positive spill over effects that potentially
455 impact on their financial performance how can this dilemma be addressed for society to continue to
456 receive the benefits of cooperative organisations. Furthermore, for managers of cooperatives needing
457 to address calls for greater environmental responsibility this research supports the need for measures
458 that can evaluate this dimension of performance

459 There are a number of limitations of the research. Firstly, analysis focused on trends, sector, and
460 geographical location. There may be other variables that may have association with the use of
461 performance measures. For example, the organisational and governance structure of cooperatives as
462 well as issues such as capital constraints or financing problems. Secondly, the focus on western
463 developed countries and consequential neglect of the measures used for measuring in non-western
464 developed countries present a restrictive finding. Additionally, the journal articles included in the
465 systematic literature review were retrieved from only two databases that are compatible with the
466 selected software. Potential journal articles that fall outside these databases were excluded from the
467 analysis. Future studies may use a third database to expand the scope of data extraction from the journal
468 articles.

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