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Developing a Methodological Framework for Agricultural Cooperatives Studies: A PRISMA Systematic Review

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Abstract

Agricultural cooperatives (ACs) play a vital role in the global agricultural sector, yet their success in food production and supply varies significantly across countries. This study presents a comprehensive review of existing literature on ACs using the PRISMA methodology and proposes a methodological framework to guide future research. Each selected study was analyzed based on four key dimensions: purpose, methodology, factors examined, and key findings. These variables were then categorized to enable a more robust comparative analysis. The review highlights that the success of ACs is driven by effective management, strong marketing strategies, and a dedicated workforce. Education emerges as a critical factor, irrespective of age or gender. However, strategies for success differ among cooperatives, underscoring the need for context-specific research to accurately assess the status and needs of ACs in various regions.

Keywords: Agricultural cooperative, Agricultural services, Cooperative, Member participation, Performance evaluation

Introduction

The rationale of the review

Cooperation is the collaborative effort of individuals or groups working towards a common goal. It has played a crucial role in the survival of our ancestors and has significantly contributed to the formation of modern society. Additionally, cooperation has the potential to facilitate success in the contemporary economic landscape of the 21st century. Agricultural cooperatives (ACs) are widely acknowledged as significant institutions in the global agricultural sector. Despite the various forms of linkages among farmers, scholarly literature indicates that ACs represent the most viable form of linkage (Van Phuong, Thi Thu Huong, & Hong Quy, 2020). Research on ACs has been conducted in numerous countries, employing diverse methodologies to explore comparable factors. The success of agricultural cooperatives in producing and delivering food to consumers varies among countries. While some studies have reported high success rates of ACs in certain countries (Iliopoulosa, Värnikb, Filippic, Võllib, & Laaneväli-Vinokurovd, 2019), others have shown less success. Research by Van Phuong *et al.* (2020) has identified factors contributing to success and failure in both developed and developing nations. The commitment of members tends to

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decrease as agricultural cooperatives grow in size. The increasing complexity of an organization and the diversity of its membership pose sustainability challenges, as highlighted by Bareille, Bonnet-Beaugrand, and Duvaleix-Tréguer (2017). Financial audits and other management deficiencies can jeopardize the long-term viability and profitability of these entities, as noted by Benson (2014). The effectiveness of agricultural cooperatives depends on their business objectives, which have been defined in various ways in the literature. Studies can be classified into two categories based on their assumptions: those assuming a singular objective and those assuming multiple objectives, as suggested by Soboh, Lansink, Giesen, and van Dijk (2009). Various analytical tools, such as the efficiency-profitability matrix (Xaba, Marwa, & Mathur-Helm, 2018), and traditional indicators (Lauermann, Moreira, Souza, & Piccoli, 2020), have been utilized to assess cooperative performance. Previous research on cooperative performance has predominantly focused on financial accounting measures. Limited empirical research has been conducted to evaluate the sustainable performance of agricultural cooperatives' operations (Marcis, de Lima, & Da Costa, 2019). According to Marcis, Bortoluzzi, de Lima, and Da Costa (2018), most sustainability assessment models for cooperatives lack an integrated approach to address the three dimensions of sustainability. Therefore, it is crucial to adopt a comprehensive approach that considers various dimensions of collaborative performance, as advocated by Franken and Cook (2015).

The aim of the current study is to provide a thorough examination of the extant literature on audit committees (AC). This review seeks to explore different facets associated with AC, including their objectives, determinants, outcomes, and research approaches. Furthermore, the study intends to put forward a methodological framework that can offer direction for future investigations in this domain.

Objectives

As indicated in the existing literature, the predominant focus of research in this field has been on various dimensions including performance, ownership, governance, finance, and member attitudes (Grashuis & Su, 2019). In cases where the variables are non-parametric, a group of similar variables is outlined in the objectives section, along with the factors and outcomes. Subsequently, a comparison is conducted among each group to identify frequently occurring variables that are considered significant within each respective category. This underscores the study's concentration on a specific subject. Potential sources of bias will be meticulously examined, and studies with a high probability of bias will be pinpointed. Following this, the key findings of these studies will be analyzed for any potential implications. The current study seeks to illustrate the relationship between objectives, contributing factors, and the success of cooperatives through the application of Vensim modeling software. The primary objective of this study is to establish a methodological framework that can be applied in future research endeavors. The framework will be presented at the culmination of the study.

Methods

Protocol of the Review

The current investigation utilized the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology to conduct an exhaustive review of studies pertaining to agricultural cooperatives (AC). The PRISMA guidelines constitute a meticulously developed and evidence-based collection of essential elements for reporting systematic reviews and meta-analyses. While the primary emphasis of the PRISMA guidelines is on reporting reviews that evaluate the impacts of interventions, they can also provide a framework for reporting systematic reviews with objectives other than intervention assessment, such as examining etiology,

prevalence, diagnosis, or prognosis (Page, McKenzie, *et al.*, 2020). Initially, relevant keywords were employed to identify studies related to AC. Key terms in this context encompass cooperation, cooperative, cooperative model, cooperative organization, agriculture, farm, agricultural cooperative, farmer cooperative, producer cooperative, agricultural service cooperative, family farming, performance, performance assessment, agricultural services, service design, agricultural service design, supply chain, agricultural supply chain, agricultural service supply chain, and associated terminology. The systematic review protocol is delineated in Figure 1.

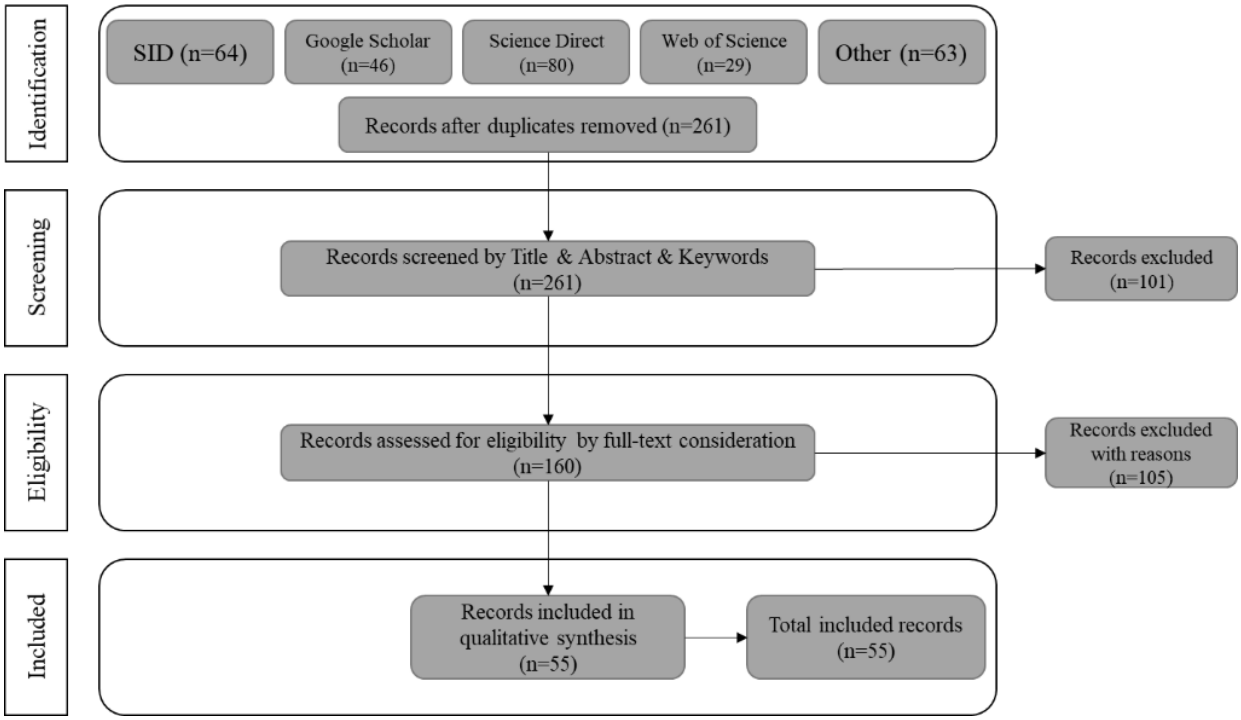

Fig. 1. Systematic review process

Eligibility Criteria

The primary criterion utilized to select relevant studies for this review was their pertinence. The evaluation of relevance involved screening the title and keywords, with further scrutiny of the abstract during the review process. The second criterion considered the publication year, with inclusion criteria specifying studies published after 2010. The third criterion focused on studies' objectives, variables studied, methodologies, and main findings. Throughout this process, separate categories were created for each aspect of the reviewed studies, which are detailed in the Results section. Studies that did not provide evidence of factors contributing to success or failure were excluded from the analysis.

Study Selection

Following an extensive search of databases, a total of 282 studies were identified based on the relevance of their keywords in titles and abstracts. Among these, 64 were sourced from the Scientific Information Database (SID), 80 from ScienceDirect, 29 from the Web of Science (WOS) database, 46 from Google Scholar, and 63 from miscellaneous sources. Subsequent to a meticulous examination, 21 duplicate studies were detected and subsequently removed. A screening process was then conducted on the initial pool of 261 studies to evaluate their relevance based on titles, abstracts, and keywords, resulting in the exclusion of 97 studies. Upon a thorough examination of the complete text of the

remaining 164 studies, 105 were excluded due to their lack of relevance to the study's purpose, factors, methods, and findings classifications. Studies published before 2010 were also excluded from the analysis. Ultimately, 55 studies met the criteria for inclusion in this systematic review. Additionally, certain book chapters were omitted during this process. A comprehensive analysis of the 164 studies led to the establishment of categories for the four main sections of a research study, which encompass primary objectives, factors under investigation, methodologies employed, and significant findings. These categories were designed to offer a comprehensive overview of various aspects of AC, facilitating the inclusion of a broader range of research variables. The frequency of each variable in the studies was considered to achieve this objective. Identical variables within each section were initially identified and categorized into respective classes, followed by the allocation of similar variables to these pre-defined classes. The purposes of the studies were classified into performance evaluation, assessing cooperative membership, identifying the main problems of cooperatives, and investigating the development and success of cooperatives. The factors studied were categorized into seven groups: structural, financial, demographic, operational, governmental, social, and environmental factors. Findings were classified into efficiency and performance, membership, advisory and suggestions, and policy-related matters. The frequency of each category was determined for each part and utilized in the analysis. To offer a comprehensive analysis of the current state of research on AC, this study considered four key indicators within each study: purposes, factors, methods, and key findings. One of the primary factors contributing to bias in research studies is an inaccurate sample size, which can lead to unreliable findings. To identify potential biases, a thorough examination of the data collection methods, including sample size (Cochran method, Morgan table), and sampling methods (simple or stratified random sampling), was conducted. An assessment was also carried out regarding the quality of the participants involved in the data extraction. The data obtained from the studies were analyzed to demonstrate diversity across categories using various charts. In order to assess potential bias among studies, we conducted a comparative analysis of the sources and methodologies employed to extract factors, the data extraction procedures utilized, and whether the studies relied on secondary research and statistical analysis or primary field research to obtain their data.

Risk of Bias Across the Studies

The majority of the studies included in this analysis gathered data through field research and interviews with various stakeholders, including AC members, managers, householders, and experts. For example, 31 studies, such as those conducted by Mozaffari (2016), utilized these methods for data collection. Other studies used different methodologies, such as literature reviews, official reports, and statistical analyses. The research in this field has employed a variety of methodologies. Some studies have used statistical analysis, reports, and academic research to explore different topics (e.g., Li and Li, 2010). In contrast, other studies have relied on academic libraries to investigate common subjects and similar themes (e.g., Benson, 2014), thereby contributing to the existing knowledge base. The data collection methods varied among the studies, with questionnaires being the most frequently used approach (39 studies, such as Shen and Shen (2018) and Brandão and Breitenbach (2019)), followed by library research (10 studies, such as Wolz, Möllers, *et al.* (2019)), and field research (5 studies, such as Marcis, de Lima *et al.* (2019)). Some studies did not specify the data extraction method used. To identify potential biases in the studies, we conducted a comparative analysis of their findings, considering the specific topics of interest being investigated. The results of the bias analysis are presented in Table 2.

Various factors can contribute to an

increased risk of bias in survey research findings. In studies utilizing questionnaires, biases can arise from the sample size and the diversity of individuals included in the sample. Therefore, it is advisable to ensure that the initial sample size is adequate. Employing a random sampling technique is essential to ensure a diverse representation of the statistical population in the sample. Furthermore, extraneous questions that are not directly related to the main research topic but can influence respondents' answers can introduce bias. The phrasing and structure of questions may inadvertently direct respondents' attention to specific issues. The sequencing of questions is another critical factor that can impact responses, particularly if it changes during the survey administration. These factors, along with others that may affect the accuracy and reliability of data collected through questionnaire-based survey studies, can be mitigated through meticulous attention and adherence to appropriate research methodologies.

Table 3 provides a comprehensive overview of the empirical literature on agricultural cooperatives (ACs), summarizing key aspects such as research purposes, methods, studied factors, and findings. The table highlights the diversity of methodologies employed, including statistical tests like T-tests and regression analysis, as well as qualitative approaches such as the Delphi method and SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis. The studied factors span economic, managerial, social, and environmental dimensions, reflecting the multifaceted nature of AC performance. Key findings often emphasize the importance of education, strategic planning, and member participation in driving cooperative success, while also identifying challenges like financial constraints and management deficiencies. This synthesis underscores the need for a holistic approach to evaluating ACs, integrating financial, operational, and social metrics to better understand their performance and sustainability. The table serves as a valuable resource for researchers aiming to identify gaps in the literature and design future studies with robust methodological frameworks.

Results

Study Selection

A total of 55 studies were selected for inclusion in this research. During this procedure, certain book chapters were excluded.

Study Characteristics

Several studies have been published within the last decade, specifically between 2010 and 2020. The studies typically had a regional scope and a sample size ranging from 100 to 1000 ACs.

Risk of Bias within Studies

The current review has identified that the studies analyzed utilized four main techniques to determine the appropriate sample size. These methods comprised the Cochran method (16 studies), the Morgan table (3 studies), the Snowball method (3 studies), and the Neyman-Pearson method (1 study). Among the 21 studies examined, it was observed that some studies did not specify the methodology used to establish the sample size. The sampling methods employed were Simple Random Sampling (13 studies), Stratified Random Sampling (6 studies), Purposive Sampling (6 studies), Multistage Sampling (2 studies), and Complete Enumeration (2 studies). From the findings of the reviewed studies, it was evident that 9 of them had insufficient sample sizes and sampling methods. The studies that demonstrate a potential for bias based on the assessed bias factors is presented in Table 1. The data collection process in the studies delineates the quality of participants into three levels. The highest level (A) is attained when the participants are experts, followed by the next level (B) when the participants are cooperative managers, and the third level (C) when the participants are cooperative members.

Table 1- Factors influencing research bias based on participant type: (A) experts, (B) cooperative managers, or (C) cooperative members (with A > B > C in influence)

	Data Extraction	Data Collection Method	Sample size method	Sampling method	Participants		Reference(s)
					Quantity	Quality	
1	Self-dependent	Questionnaire	Cochran	Simple Random Sampling (RS)	165	C	(Donyaei, Yaghoubi, & Rajaei, 2010)
2	Self-dependent	Questionnaire	Cochran	Simple RS	212	A	(Baseri, Sadeghi, & Khaksar, 2010)
3	From different studies	Library Research	Not mentioned	-	10	C	(Li & Li, 2010)
4	Self-dependent	Questionnaire	Cochran	Stratified RS	250	C	(Ghiasvand Ghiasy & F.Hosseini, 2011)
5	From similar studies	Questionnaire	Cochran	Stratified RS	209	C	(Solouki, Malekmohammadi, & Chizari, 2011)
6	Self-dependent	Questionnaire	Not mentioned	-	50	B	(Mahazril'Aini, Hafizah, & Zuraini, 2012)
7	From similar studies	Library Research	Not mentioned	-	11	C	(Benson, 2014)
8	Self-dependent	Questionnaire	Not mentioned	-	1000	C	(Franken & Cook, 2015)
9	From similar studies	Questionnaire	Cochran	Simple RS	168	A	(Savari, Dorrani, & Shabanali Fami, 2015)
10	From similar studies	Questionnaire	Not mentioned	-	20	C	(Hosseini & Mahdizadeh, 2015)
11	Self-dependent	Field Research	Not mentioned	-	-	-	(Tsymbalista, 2016)
12	Self-dependent	Questionnaire	Cochran	Simple RS	49	B	(Mozaffari, 2016)
13	From similar studies	Questionnaire	Cochran	Simple RS	133	C	(Rasouliazar, Kivanifar, & Rashiedpour, 2016)
14	Self-dependent	Field Research	Not mentioned		3205	C	(Bareille *et al.*, 2017)
15	Self-dependent	Field Research	Not mentioned	-	487	A	(Gao, Zhang, Wu, Yin, & Lu, 2017)
16	Self-dependent	Field Research	Not mentioned	-	128	C	(Shamsuddin, Ismail, Mahmood, & Abdullah, 2017)
17	Self-dependent	Questionnaire	Not mentioned	-	30	B	(Kurakin & Visser, 2017)
18	From different studies	Questionnaire	Not mentioned	-	12	C	(Shen & Shen, 2018)
19	From different studies	Library Research	Not mentioned	-	15	C	(Anzilago, Panhoca, Bezerra, Beuren, & Kassai, 2018)
20	From similar studies	Library Research	Not mentioned	-	-	-	(Iliopoulos & Valentinov, 2018)
21	Self-dependent	Field Research	Not mentioned	Purposive S	17	C	(Marcis *et al.*, 2019)
22	From similar studies	Questionnaire	Not mentioned	Simple RS	10	B	(Brandão & Breitenbach, 2019)
23	Self-dependent	Questionnaire	Not mentioned	-	8	C	(De Rosa, McElwee, & Smith, 2019)
24	NA	Questionnaire	Not mentioned	-	280	C	(Piwoni-Krzeszowska, 2019)
25	Self-dependent	Questionnaire	Not mentioned	-	7	B	(Ribašauskienė *et al.*, 2019)
26	From different studies	Questionnaire	Not mentioned	-	-	-	(Wolz *et al.*, 2019)
27	From similar studies	Library Research	Not mentioned	-	-	C	(Bijman, 2020)
28	Self-dependent	Questionnaire	Not mentioned	-	162	C	(Fawen & Cheng, 2020)

Results of Individual Studies

The objective of this study was to gain a comprehensive understanding of the research framework pertaining to AC. We have opted to explicate the principal components of each study based on these criteria. Accordingly, the studies were deconstructed into four distinct components, namely research purposes, studied factors, methods, and findings

Synthesis of Results

Purpose's classification

The research purposes were classified into four distinct categories: performance evaluation, assessment of cooperative membership, identification of cooperative main problems, and investigation of the development and success of cooperatives. The frequency distribution of each category observed in the reviewed studies is depicted in Figure 2.

Table 2- Findings bias across studies

Topic	Studied Factor(s)	Key Finding(s)	Sample Size Validity	Reference(s)
Member Participation	General attributes, Market information, Decision making, Form of management	Low participation of members in cooperative decisions points to deficient management	Not valid	(Brandão & Breitenbach, 2019)
	Member participation, social capital Common beliefs, Awareness of the principles of cooperation	Studied factors can explain 39 percent of the variance in member participation	Valid	(Ansari, Jourablou, Pourafkari, & Hashemianfar, 2015)
	Economic factors, Member's features Organizational factors, Socio-cultural factors, Educational factors, Management factors, Political factors	Economic factors had the biggest impact on cooperative development, while members' features and political factors had no impact	Valid	(Pirouz & Gholipoor, 2018)
	Strategic planning, Member participation	Strategic planning and member participation are effective on cooperatives' overall success and performance	-	(Mahazril'Aini *et al.*, 2012)
	Heterogeneity factors	Solutions based on member loyalty and commitment not only failed but also resulted in unfortunate side effects	-	(Iliopoulos & Valentinov, 2018)
	Creativity and innovation, Free and optional membership, Economic participation of members, Independence of cooperatives, Cooperation between cooperatives	Studied factors affect member participation and cooperative success	-	(Hosseini & Mahdizadeh, 2015)

Table 3- General overview of the empirical literature on AC

Purpose(s)	Method(s)	Studied factor(s)	Key finding(s)	Reference(s)
Identifying and investigating the causes of the failure of AC	T-test	High fees for bank facilities, Insufficient market demand, High cost of raw materials, lack of specialized staff, High cost of hiring, Insufficient company capital, Weak marketing services	Studied factors had an important role in the cooperative's lack of success	(Khafaie, 2010)
Investigating and identifying the effective factors for strengthening and developing entrepreneurship in agricultural production cooperatives	Pearson correlation coefficient, ANOVA test	Board education level, Age and education of the CEO, Total number of members	Education and success are related	(Donyaei *et al.*, 2010)
Identifying and analyzing the role of production cooperatives on rural development	Chi-Square method, T-test	Average membership income, Production performance, Area under cultivation, Return on investment, Land and labor, Migration rate, Participation in productive and social affairs, Job satisfaction level	Cooperation has changed the traditional way of looking at agriculture into the commercial way	(Baseri *et al.*, 2010)
Investigating the factors affecting the success of production cooperatives	Wilcoxon signed-rank test	Sociocultural, Personality, Managerial Educational, Economic	Because knowledge, insight, skill, and ability are adventitious; education plays an important role in providing solutions	(Karami & Agahi, 2010)
Evaluating the level of performance of agricultural leading enterprises	BP neural network model, AHP (Analytic Hierarchy Process) method	Sustainability factors	A reasonable performance evaluation system can effectively improve operational efficiency	(Li & Li, 2010)
Analysis of barriers and limitations of employment development in agricultural production cooperatives	Delphi method	Technical, Financial, Structural, Marketing and sales, Managerial, Legal	Studied factors show a 76.5 percent impact on development barriers	(Ghiasvand Ghiasy & F.Hosseini, 2011)

Investigating the effectiveness of extension training activities in improving the activities of agricultural production cooperatives	Spearman's rank correlation coefficient, Regression analysis	Age, education, Total annual income, Cooperative revenue, Area under cultivation, Consulting with experts	Education was 53.8 percent effective on farmer knowledge	(Solouki *et al.*, 2011)
Identifying the problems of marketing agricultural products of production cooperatives	Delphi method, AHP (Analytic Hierarchy Process) method	Economic, Managerial, Operational, Market, Structural	The lack of marketing plans and not using experts are the most important bottlenecks	(Ghadiri Moghaddam & Nemati, 2011)
Examining the factors influencing a cooperative's performance through strategic planning and members' participation.	Pearson's correlation coefficient	Strategic planning, Member participation	Strategic planning and member participation are effective on cooperatives' overall success and performance	(Mahazril'Aini *et al.*, 2012)
Case study of inactive cooperatives to identify the reasons for their inactivity	Delphi method	The inefficiency of the banking system, Lack of efficient labor, Procrastination and delegating responsibilities to each other, High cost of providing inputs	Problems inside the cooperatives had a big impact on their failure	(Hazrati & Babaei Fini, 2012)
Assessing whether cooperative membership increases the likelihood of the adoption of fertilizers, improved seeds, and pesticides	PSM (Propensity Score Matching) method	Age, Gender, Education, Household size, Leadership position, Wealth	Cooperative membership improves the mean fertilizer adoption rate by about 9–10 percentage	(Abebaw & Haile, 2013)
Performance evaluation of AC	T-test	Social items, Economic items, Environmental items	From member's perspective cooperatives were successful but from the agency's point of view they were not economicly successful	(Portaheri, Papoli, & Fallahi, 2013)
Determining the economic efficiency of agricultural production cooperatives and the factors affecting their economic efficiency	Chi-Square method, T-test	Variety of activities, Current value of capital, Value of initial capital, The amount of managerial knowledge, The value of other activities	Manager's education is important in the cooperative success	(Shajari, Barikani, & Amjadi, 2013)
Identifying options for financial auditing system for agricultural cooperatives	-	Agricultural cooperative auditing	Commercially viable cooperatives will require regular financial audits as part of the standard management practices	(Benson, 2014)
Identifying the effective factors in improving the level of economic efficiency of agricultural production cooperatives	DEA (Data Envelopment Analysis) method	Number of members, Marginal profit, The current value of capital, Managerial knowledge	Managerial knowledge, experience, and education can improve cooperative performance	(Sepehrdoost & Yosefi, 2014)
Examining the impact of strategic planning on firm performance in the agribusiness sector	Spearman's correlation coefficient	Overall profitability, Competitive position in your industry, Member satisfaction, Ability to achieve the vision, Overall performance	cooperatives make sacrificing one performance attribute for better performance on another	(Franken & Cook, 2015)
Investigating the social factors affecting the participation of members of agricultural cooperatives	Pearson correlation coefficient, T-test, Multiple regression analysis	Member participation, Social capital, Common beliefs, Awareness of the principles of cooperation	Studied factors can explain 39 percent of the variance in member participation	(Ansari *et al.*, 2015)
Investigating the role of agricultural production cooperatives in achieving sustainable development in the agricultural sector	the interval of standard deviation from the mean (ISDM), Bartlett's test, KMO (Kaiser-Meyer-Olkin) test, Varimax rotation	Personal and professional characteristics, Study towards sustainable development, the role of production cooperatives in achieving sustainable development	Member's lack of knowledge of sustainable development is proved	(Savari *et al.*, 2015)

Investigating the relationship between entrepreneurial spirit and adherence to cooperative principles	Spearman's rank correlation coefficient	Creativity and innovation, Internal control, Free and optional membership, Economic participation of members, Self-government and independence of cooperatives, Cooperation between cooperatives	Studied factors affect member participation and cooperative success	(Hosseini & Mahdizadeh, 2015)
Identifying performance evaluation indicators of AC; Quantitative and qualitative improvement of these organizations; Identity successful AC	Delphi method	Social, Economic, Individual, Legal, Educational, Environmental	Profitability with 89.3 percent and education with 86.2 percent are the most important factors of success	(Heydari, Naderi Mahdei, Yaeghoubi Farani, & Heydari, 2015)
Investigating the effect of cultural capital and demographic variables on the performance of agricultural cooperatives	Bartlett's test, KMO(Kaiser-Meyer-Olkin) test, Regression analysis	Membership, Customer Orientation, Cultural capital, Consumption of cultural goods, Cultural behavior and practices, Non-financial performance	Consumption of cultural goods and Cultural behavior and practices was 33.6 percent effective on cooperative performance	(Mirfardi, Ahmadi, Sadeqnia, & Rostami, 2015)
Identifying the weaknesses, strengths, opportunities, and threats of agricultural production cooperatives	Bartlett's test, SWOT (Strengths, Weaknesses, Opportunities, and Threats) matrix	Strengths, Weaknesses, Opportunities, Threats	Cooperatives have a good chance of success only if they use good approaches	(Ohadi & Kurki Nejad, 2015)
Understanding the views of those involved in agricultural production cooperatives on economic issues	Coefficient of variation, Multiple regression analysis	Personal and professional characteristics, Activities and goals, Economic issues, Problems, and obstacles to achieving goals	Preparation and distribution of agricultural inputs is one of the key factors in achieving the goals of cooperatives	(Paloj & Teymori, 2015)
Identifying the factors of family farms' reluctance to entrepreneurship	-	Economic pushing and pulling factors, Ideological pushing and pulling factors	farmer advise and support must of necessity be tailored to individual farm circumstances	(Aisling, Seamus, & Mary, 2016)
Identifying the main problems of developing the services of agricultural cooperatives	-	Development problems	low activity of rural population in participating in cooperatives, lack of funds to finance the fixed assets purchase	(Tsymbalista, 2016)
Determining the economic efficiency of AC and prioritizing the problems they face in the management process and marketing system	AHP (Analytic Hierarchy Process) method	Quantitative and qualitative characteristics of cooperatives and managers, Socio-economic characteristics, Problems, and obstacles	Conducting location studies before establishing cooperatives is crucial for cooperative success	(Mozaffari, 2016)
Analysis of obstacles to the progress of agricultural production cooperatives	Exploratory Factor Analysis	Social, Economic, Administrative and legal, Information and marketing barriers, Capital barriers	Studied factors had a 69 percent effect on cooperatives	(Rasouliazar *et al.*, 2016)
Identifying the factors affecting the success of agricultural production cooperatives	Multiple regression analysis	Sociocultural, Educational, Managerial, Economic, Operational, Environmental, Structural, Age, Job experience	Studied factors are 52.5 percent effective in cooperative success	(Ahmadpor, Mokhtari, & Porsaeed, 2016)
Assessing the determinants of member commitment	Probit model	Economic involvement, Innovation, Training, Supply services, Total Sales	Studied factors have an impact on member commitment	(Bareille *et al.*, 2017)
Enriching international literature on exploring family farm growth in China; expanding dimension constitution of resource-based theory	hierarchical linear model, entropy method	Material capital resources, Human capital resources, Organizational capital, Financial capital resources, Social ecology, Economic ecology, Natural ecology, Financial index, Profit potential	Studied factors such as education and improvement of production equipment had positive effects on the growth of family farm	(Gao *et al.*, 2017)
Investigating the economic performance of AC	Regression analysis, Breusch-Pagan LM test, Hausman test	The current ratio, Leverage, Net fixed asset Turnover, Investment, Dividend, Cooperative size, Return on equity, Return on total assets	Studied factors are significant indicators of cooperative financial performance	(Shamsuddin *et al.*, 2017)
Weaknesses and strengths of top-down cooperatives	interviews and observations	Top-down cooperatives problems	Top-down cooperatives and not member-controlled cooperatives do not show success	(Kurakin & Visser, 2017)

Identifying and prioritizing marketing barriers for agricultural production cooperatives	T-test	Economic, Managerial, Human, Market, Structural, Operational	Economic barriers and the presence of the fixers had the most impact on cooperative marketing	(Feizabadi & Javadi, 2017)
Accurate evaluation of the performance of agricultural cooperatives	Fuzzy Delphi method	Economic, Social, Managerial, Legal, Educational, Individual	Studied factors can be considered the most important factors affecting cooperative performance	(Heydari, Naderi Mahdei, Yaghoubi Farani, & Heidary, 2017)
Analysis of components affecting the sustainable development of agricultural cooperatives	Factor analysis, Chi-Square method	Social, Economic, Environmental, Institutional	Studied factors have a 63 percent impact on the sustainable development of cooperatives	(Haji, Chizari, & Chobchian, 2017)
Examining the impact of agricultural cooperative membership on the technical efficiency (TE) of apple farmers	SPF (Strategic Prevention Framework) model	Age, Gender, Education, Household size, Orchard size, Off-farm work, Access to credit, Farming vehicle	Cooperative members have better efficiency than non-members; Factors affecting productivity are different for members and non-members	(Ma, Renwick, Yuan, Ratna, 2018)
Examining the comparative performance of agro-industrial cooperatives considering the economic-financial and socioeconomic dimensions	Spearman's correlation coefficient, Walk method	Growth and development of cooperative members, Financial results, Assistance/satisfaction of cooperative members, Economic and financial stability, Capacity of facing a crisis, Credibility and soundness, Quality management	cooperatives with better relative economic-financial performance are not listed among those that best promote the well-being of their members	(Lauermann *et al.*, 2020)
Construct and analyze the research landscape on the sustainability performance evaluation of agricultural cooperatives' operations	ProKnow-C Method	Sustainability factors, Performance evaluation	Most evaluation models are for decision making	(Marcis *et al.*, 2018)
Investigating the development of cooperatives and family farms	Semi-structured interviews	Family farm and Cooperatives programs	The incoherence and distrust among farmers undermine their ability to form a genuine cooperative for mutual benefits	(Shen & Shen, 2018)
Examining the level of commitment to cooperative principles	Multiple correspondence analysis, Chi-square method	Capital manufactured, Social capital and relationship, Human capital, Natural capital, Intellectual capital, Financial capital, Postage	there is a narrow understanding of GRI G4 principles among cooperatives' employees that could be addressed with educational activities	(Anzilago *et al.*, 2018)
Performance evaluation of agricultural cooperatives	Delphi method, Judgment matrix method	Economic Performance, Non-economic performance	The evaluation results can more realistically show the actual development of cooperation and have a positive guiding effect on the future development	(Shao, Xu, & Ma, 2018)
Investigating the effect of tacit knowledge exchange on marketing performance in agricultural production cooperatives	Partial Least Squares method	Senior executives support, Trust among employees, Social opportunities, Coordination of functional parts, Quality of communication, Size of the company, Experience, Environmental instabilities	Studied factors can improve cooperative marketing	(Baghbani Arani, Maghsoudi Ganjeh, Ariyapour, Sotudeh Arani, & Mehtari Arani, 2018)
Identifying the factors affecting the development of agricultural cooperatives	T-test, Factor analysis	Economic factors, Member's features, Organizational factors, Sociocultural factors, Educational factors, Management factors, Political factors	Economic factors had the biggest impact on cooperative development, while members' features and political factors had no impact	(Pirouz & Gholipoor, 2018)
Investigating the sustainability of agricultural cooperatives	-	Heterogeneity factors	Solutions based on member loyalty and commitment not only failed but also resulted in unfortunate side effects	(Iliopoulos & Valentinov, 2018)

Performance evaluation through return and profitability analysis	DEA (Data Envelopment Analysis) method	Efficiency, profitability	Efficiency does not always translate to profitability, there is a need for managers to continuously measure performance and investigate areas of improvement	(Xaba *et al.*, 2018)
Assessing the adherence to a set sustainability performance indicator to form an assessment model for agricultural cooperatives' operations	SAAC (Sustainability Assessment of Agricultural Cooperatives) method	Sustainability factors, Commercial relations, Specific indicators of the cooperatives	Studied indicators were adequate to the sustainability practices in the operations of agricultural cooperatives	(Marcis *et al.*, 2019)
Identifying the main problems encountered in the management of agricultural cooperatives	semi-structured questionnaire	General attributes, Market information, Decision making, Form of management	Low participation of members in cooperative decisions points to deficient management	(Brandão & Breitenbach, 2019)
examining the role of serendipity on the entrepreneurial process of diversification	face-to-face semi-structured interviews	Business characteristics, Business activities, and processes, Personal characteristics of the farmer, Entrepreneurial skills of the farmer	A clear division of labor between older and younger generations and between male and female farmers can be used to manage the various categories of skills	(De Rosa *et al.*, 2019)
Investigating the financial situation of Czech and Polish AC	T-test, U-Mann-Whitney test	Total assets, Fixed assets, Total liabilities, Net profit	Most of the commonly used financial measures give an incomplete picture of a cooperative's performance	(Piwoni-Krzeszowska *et al.*, 2019)
Analysis of barriers and incentives for the development of AC	Semi-structured survey method	Policy factors	Policy measures mostly promote or have a neutral impact on the development of cooperatives, institutional environment focuses on the traditional concept of the cooperatives	(Ribašauskienė *et al.*, 2019)
Identifying barriers to stunted growth of agricultural service cooperatives	-	Historical obstacles, Mental obstacles, Structural obstacles, Political and institutional obstacles	Members who are pioneering cooperative development in an environment of low trust, share common characteristics	(Wolz *et al.*, 2019)
understanding family farm succession dynamics in extensive livestock farming of two marginal areas in Spain	Axial coding	Potentiality, Willingness, Effectiveness	Successor willingness is a key step in succession and less attention is paid to this step by policymakers	(Bertolozzi-Caredio, Bardaji, Coopmans, Soriano, & Garrido, 2020)
Investigating large organizational differences and performance characteristics of cooperatives	-	Heterogeneity factors	Only when researchers obtain a good understanding of the organizational and functional characteristics of the cooperatives they are studying, their research will generate unambiguous insights	(Bijman, 2020)
Investigating the supply chain of agricultural cooperative services	Variance analysis	Pre-and post-production supply services, financing services	the level of education significantly positively affects the supply of cooperative services	(Fawen & Cheng, 2020)

The results reveal that the investigation of the development and success of agricultural cooperatives (AC) attracted significant interest during the early years of the previous decade but experienced a decline in attention by 2012. Subsequently, research focus shifted towards performance evaluation, which has remained a primary area of interest since 2012. Moreover, published studies have increasingly incorporated the assessment of AC membership as a research objective since 2014. The identification of the main problems

faced by AC since 2015 has been the subject of several studies published by Feizabadi and Javadi (2017) and Brandão and Breitenbach (2019).

A diagram illustrating the objects contained within each category is presented in Figure 3. In order to maintain diagrammatic simplicity, we have limited the inclusion of objects to a maximum of three.

Factor's classification

The research being examined encompasses seven distinct categories of factors: structural, financial, demographic, operational, governmental, social, and environmental factors. The distribution frequency of each category within the sample under analysis is visually depicted in Figure 4.

The predominant focus of research has been on financial aspects within the context of agricultural cooperatives. While evaluating the success of a cooperative based on its financial returns for members may appear logical, it is essential to acknowledge that efficiency does not always translate to profitability. Relying exclusively on financial metrics for assessing the performance of an agricultural cooperative may lead to a limited comprehension of the diverse factors influencing its success, including regional marketing policies that vary across different areas. Therefore, a more holistic approach to performance evaluation is imperative to gain a deeper insight into the elements contributing to the prosperity of an agricultural cooperative. Structural factors constitute a significant area of study alongside financial considerations. While fundamental concepts of agricultural cooperatives are crucial, the level of emphasis on this subject may be considered excessive. Operational and social factors hold substantial importance, yet they often receive comparatively less attention than financial factors. Operational factors, such as management and performance, serve as critical indicators of success. Social factors exert both direct and indirect influences on nearly every aspect of cooperative existence, with member participation standing out as a prominent tangible factor.

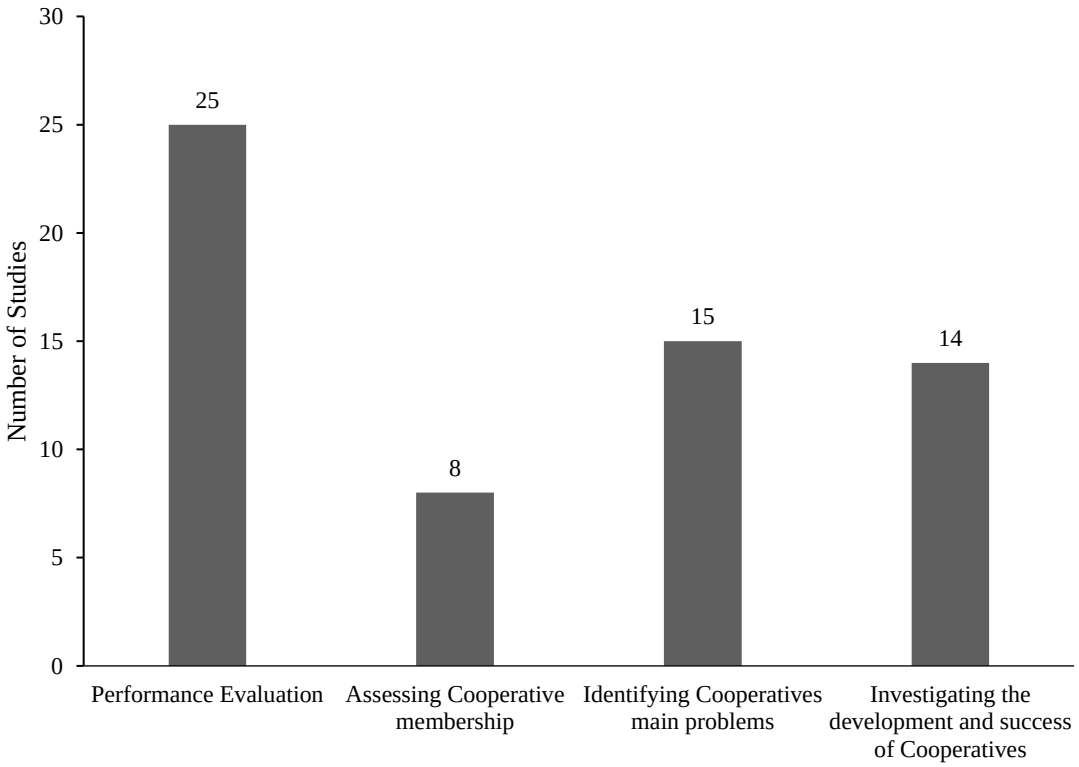

Fig. 2. Frequency of purpose classification

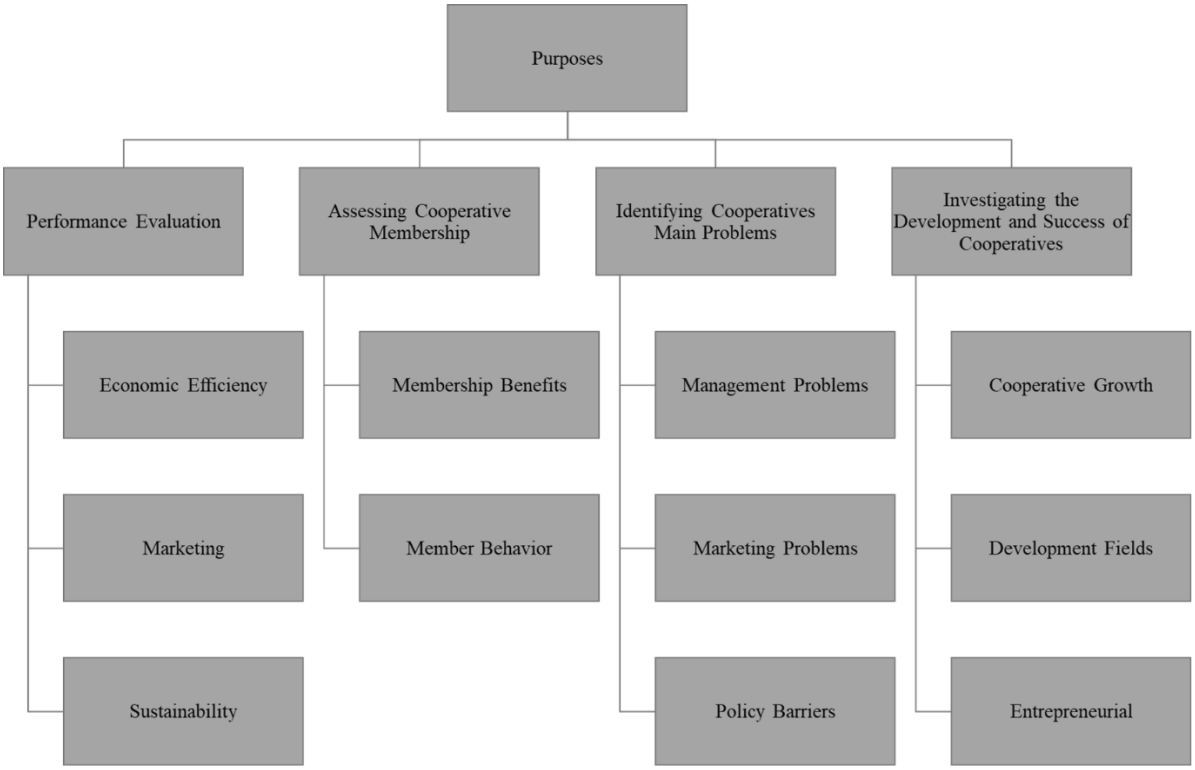

Fig. 3. Diagram of purposes

The significance of governmental policies cannot be overstated; however, it may not be advisable to allocate extensive research resources to this area. Demographic variables like age and gender do not seem to have a significant impact on the success of agricultural cooperatives. Nevertheless, the level of education has been identified as a potentially influential factor. Despite the importance of environmental factors, they are frequently accorded low priority in the context of agricultural cooperatives. Nonetheless, it is crucial to monitor indicators such as input consumption and pollution, and regulate them appropriately to ensure sustainable and environmentally responsible practices within agricultural cooperatives. In conclusion, it is recommended that forthcoming studies prioritize the examination of financial, operational, and social factors while also considering potential environmental impacts.

Figure 5 depicts a diagram of the factors that were studied, including the associated objects. Similar to the diagram of purposes, each branch is limited to a maximum of three objects.

Methods

The utilization of data analysis methods in the selected studies is depicted in Figure 6. Both parametric and non-parametric tests are commonly used in statistical analysis. The T-test, Regression analysis, and Delphi method are frequently employed statistical techniques in research. The T-test is utilized to determine the statistical significance of a hypothesis concerning the subject under study (Feizabadi & Javadi, 2017). Regression analysis is a robust statistical technique that aids in identifying variables that significantly impact a topic of interest. It enables the identification of significant factors, exclusion of irrelevant ones, and assessment of their interrelationships with confidence (Aldrich, 2005). Ansari *et al.* (2015) and Mirfardi *et al.* (2015) utilized regression analysis in their studies. The Delphi method, as applied by Heydari *et al.* (2017) and Shao *et al.* (2018), is a systematic approach used to achieve consensus or decision-making among a group of experts

through surveys and feedback iterations. The method involves gathering responses from experts through multiple rounds of questionnaires, which are then compiled and shared with the group.

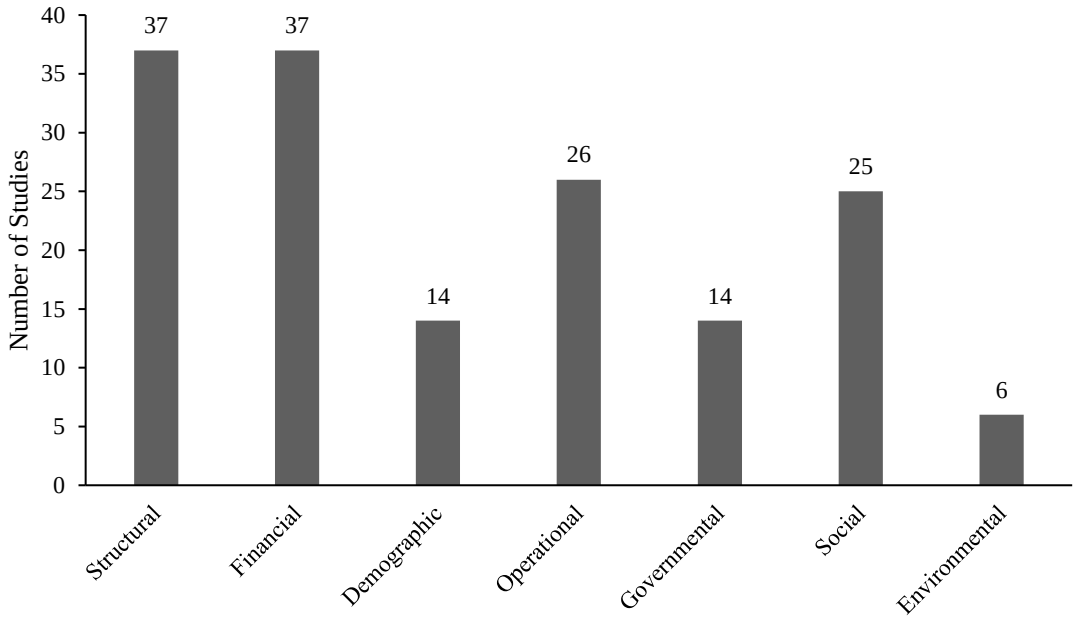

Fig. 4. Frequency of studied factors classification

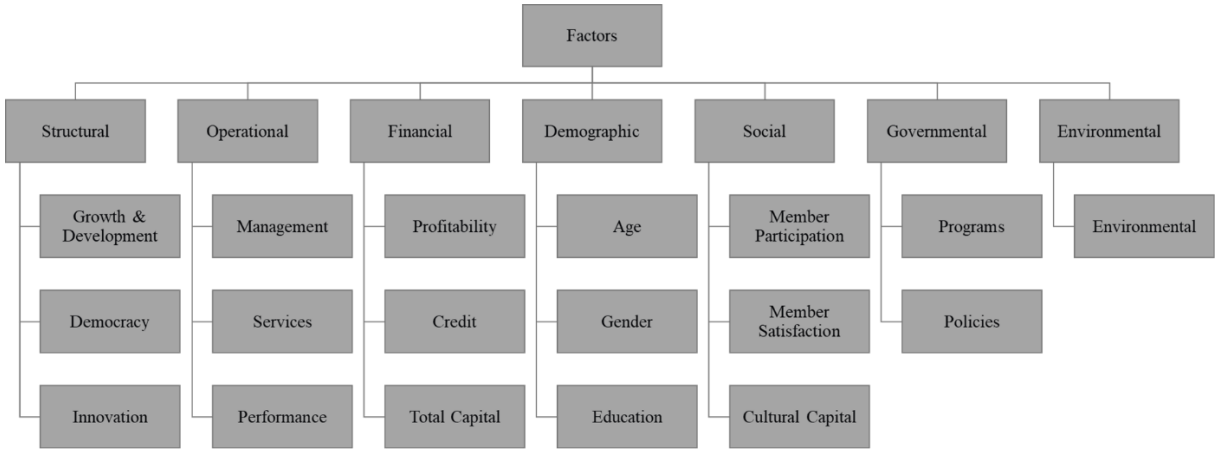

Fig. 5. Diagram of the studied factors

Despite criticisms for its lack of clear methodological guidelines, the Delphi method requires continued commitment from participants who may be asked the same question multiple times, and lacks evidence regarding its reliability. The Analytic Hierarchy Process (AHP) is a precise methodology for determining the relative importance of decision criteria through weight quantification. The magnitudes of factors are estimated through pair-wise comparisons based on the experiences of individual experts. Respondents use a specifically designed questionnaire (Mozaffari, 2016) to compare the relative significance of each pair of items. This methodology is also supported by Ghadiri Moghaddam and Nemati (2011). A drawback of the Analytic Hierarchy Process (AHP) is the subjective nature of decision-making, often influenced by obscure human emotions

(Forman & Gass, 2001). The Bartlett and KMO tests were used to validate the factors under study by Savari *et al.* (2015) and Ohadi & Kurki Nejad (2015). The prevalent approach for data collection and evaluation in the field of AC research over the past decade appears to be the utilization of the T-test in conjunction with the Delphi technique or Analytic Hierarchy Process (AHP).

Findings

The outcomes should align with the research objectives and the variables being studied. Therefore, we classified the significant findings of the examined studies into four specific categories. These identified categories include efficiency and performance, membership, advisory and suggestions, and policy-related results. The distribution frequency of each category is illustrated in Figure 7.

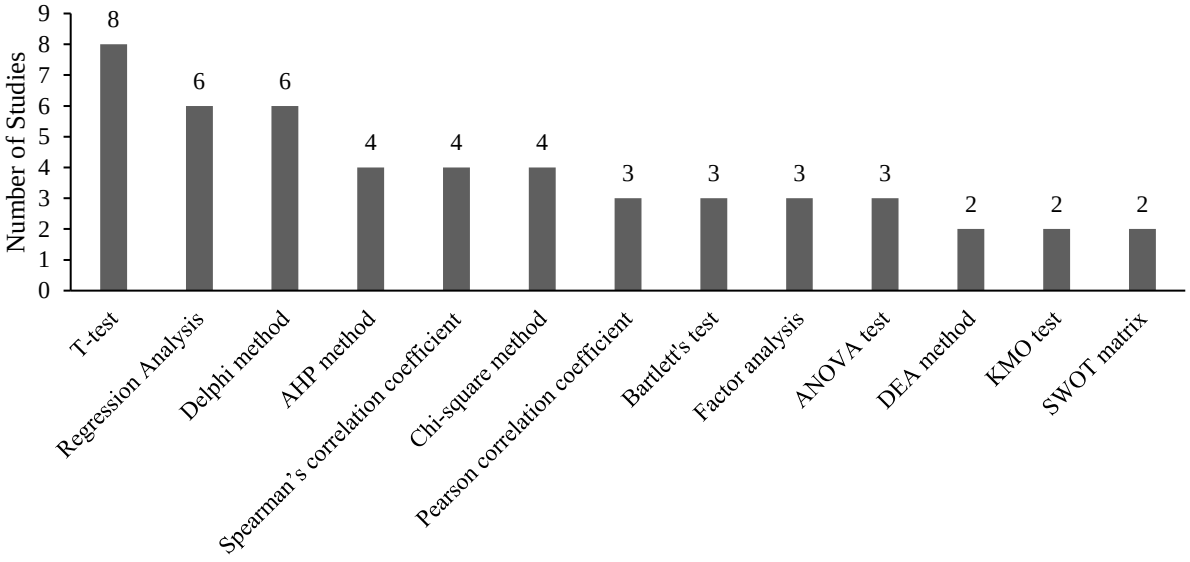

Fig. 6. Frequency of methods used in selected studies

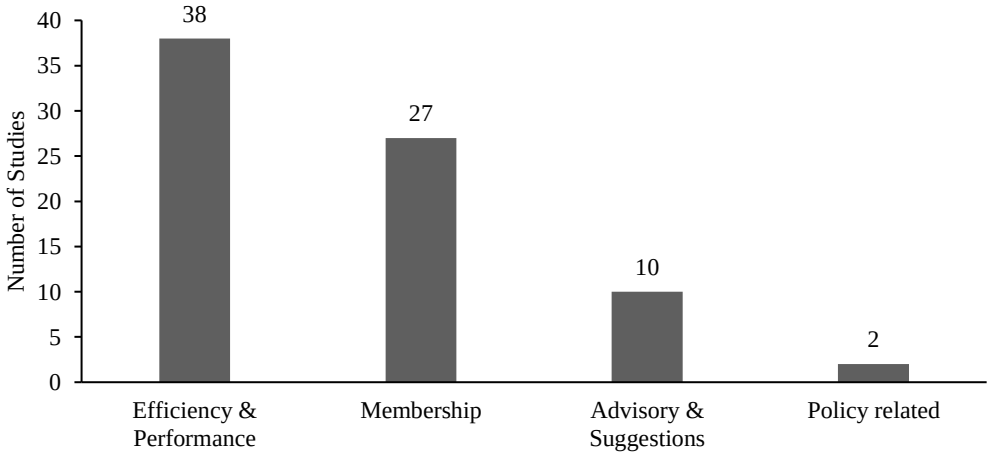

Fig. 7. Frequency of key findings classification

Various studies conducted by different researchers have explored the factors influencing the success and challenges faced by cooperatives. Donyaei *et al.* (2010) and Karami & Agahi (2010) highlighted the significant role of education in fostering

cooperation. Ghadiri Moghaddam and Nemati (2011) identified the absence of marketing strategies and the failure to involve experts as key hindrances to the advancement of air conditioning systems. Mahazril'Aini *et al.* (2012) and Hazrati and Babaei Fini (2012) emphasized the impact of membership on cooperative sustainability. Specifically, Mahazril'Aini *et al.* (2012) underscored the importance of member engagement in determining cooperative success, while Hazrati and Babaei Fini (2012) pointed out that internal disagreements among members can lead to failure. Shajari *et al.* (2013) stressed the essential role of effective AC management in achieving success, noting that managers with higher educational qualifications tend to have more successful careers. Sepehrdoost and Yosefi (2014) conducted a study that corroborated previous findings, indicating that managerial knowledge, experience, and education can enhance cooperative performance. Franken and Cook (2015) observed that cooperatives often make trade-offs between different performance attributes to improve overall performance. Mozaffari (2016) highlighted the importance of conducting location studies before establishing cooperatives to ensure their success. Kurakin and Visser (2017) reported that top-down cooperatives, in contrast to member-controlled cooperatives, were not successful in Russia. Iliopoulos and Valentinov (2018) found that strategies focusing on member loyalty and commitment to achieve cooperative sustainability were ineffective and led to unintended consequences. Piwoni-Krzeszowska *et al.* (2019) noted that conventional financial measures may not offer a comprehensive assessment of cooperative performance. Additionally, Bijman (2020) determined that a higher level of education positively influences the provision of cooperative services.

The categories illustrated in Figure 7 have been expanded upon in a diagram. Figure 8 presents the objects that belong to each category.

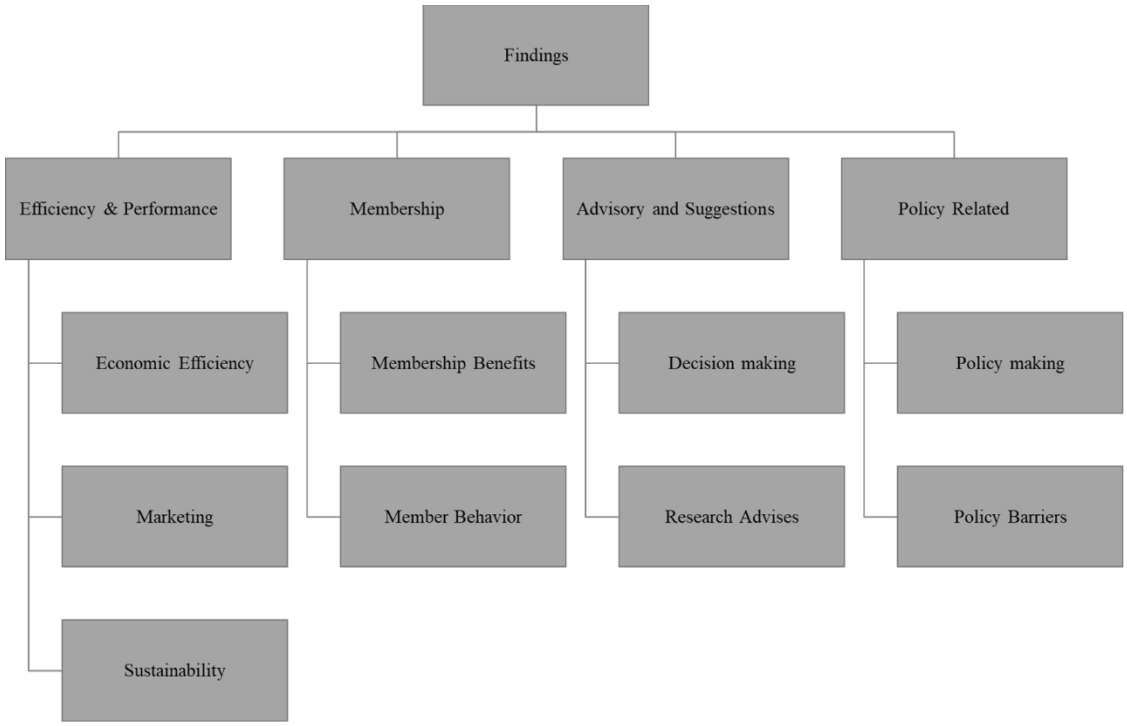

Fig. 8. Key findings of selected studies

Path analysis

The relationship between the factors analyzed and their influence on the success of cooperation is visually represented in Figure 9,

drawing upon the conclusions of pertinent research. The size of each circle in the figure corresponds to its perceived significance as indicated by the study. Arrows in the figure signify the impact of one element on another, with the object at the arrow's origin affecting the object at its endpoint. These impacts were identified through a thorough examination of selected studies, revealing instances of reciprocal interactions among certain elements. The results suggest that a majority of the variables investigated have a notable effect on the effectiveness, performance, and membership status of agricultural cooperatives, reflecting the researcher's specific focus on these objectives. The illustration presented was created using version 7.3.5 of Vensim PLE.

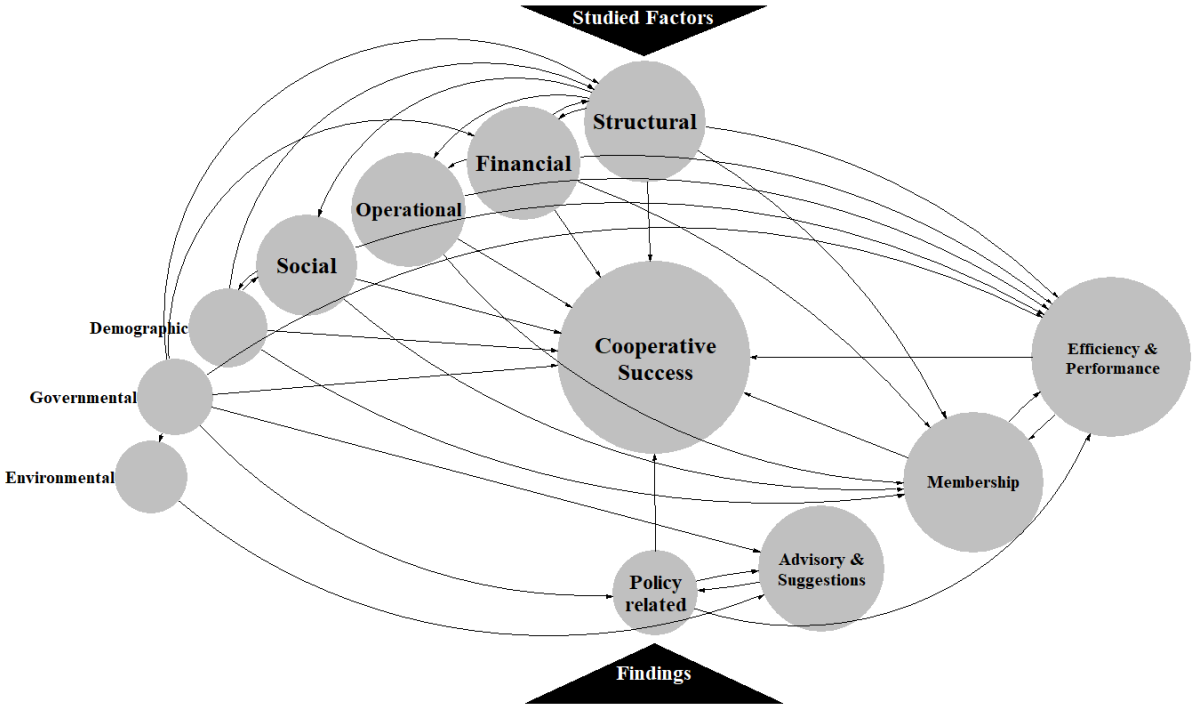

Fig. 9. The relation between studied factors and key findings of studies

Discussion

Summary of evidence

The concept of Agricultural Cooperatives (AC) involves a group of agricultural workers forming a union to work collaboratively. This allows individuals to access benefits provided by governmental bodies, often associated with socialist governments, to enhance their market influence. These associations may have the capacity to impact the market or government policies positively or negatively. In contemporary times, cooperatives are more focused on economic objectives, diminishing the historical significance of cooperatives. Research has explored the factors contributing to successful cooperation, revealing that effective management, successful marketing, and committed members are crucial for AC's success. Education is deemed essential regardless of age or gender. Similar to other businesses, AC must prioritize operational efficiency to attain financial viability. The study analyzed 55 publications on AC from 2010 to 2020, with Figure 10 illustrating the distribution of studies over the years examined.

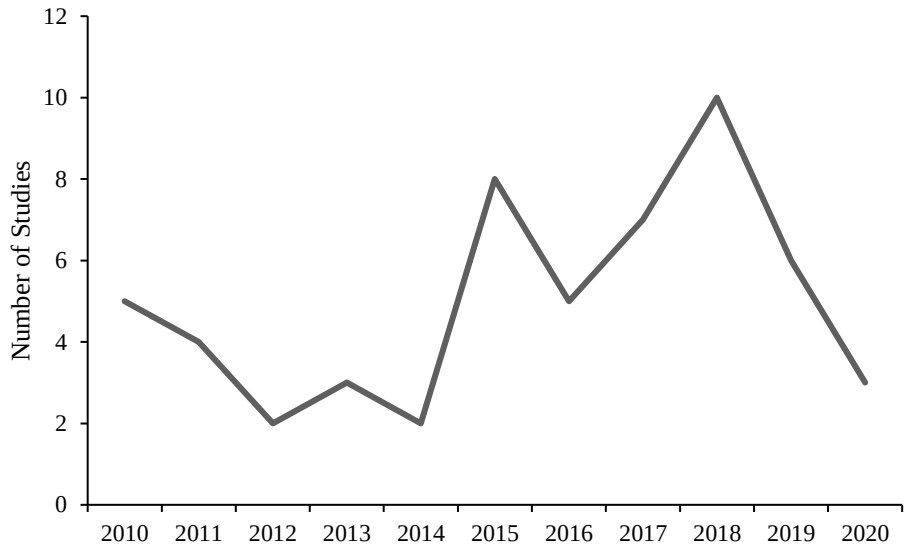

Fig. 10. Distribution of studies from 2010 to 2020

It is visible that there are more papers in the year 2018 followed by the year 2015.

Limitations

The constraints associated with these studies pertain to the identification and choice of research variables, modification of literature review variables to suit the geographical context of the study, and ensuring a sufficient sample size to obtain dependable outcomes.

Conclusion

This study presents a comprehensive overview of the current academic literature on the subject of Agricultural Cooperatives (AC). Out of the 261 studies initially reviewed, only 55 studies met the predetermined selection criteria. The data extracted from each study is typically categorized into four main groups, including research objectives, factors under investigation, methodologies employed for data collection and analysis, and key findings. Given the non-parametric nature of the variables in this field, there is a wide range of variables with diverse nomenclature. Similar factors were grouped into distinct clusters within each section. The reviewed studies were categorized into four main themes: performance evaluation, membership evaluation in cooperatives, identification of primary challenges faced by cooperatives, and examination of the progress and success of cooperatives. The analysis revealed that in the past decade, scholars have predominantly focused on evaluating the effectiveness, operational efficiency, and financial performance of AC. The factors related to AC were classified into seven groups: structural, financial, demographic, operational, governmental, social, and environmental. The studies primarily examined the structural and financial factors influencing AC presence, with additional attention to social and operational factors. Key findings were grouped into four categories: efficiency and performance, membership, advisory and recommendations, and policy-oriented. As research in this field primarily centers on assessing AC efficiency and performance, the majority of results also focus on performance. Each study contributes to a deeper understanding of cooperative practices among farmers. However, inconsistencies were noted in the objectives and variables examined, leading to a wide range of proposed solutions. Readers are advised to consider specific contexts for the applicability and endorsement of these solutions. Conducting dedicated research that accounts for various influencing variables is recommended to obtain accurate information on the status of AC in a particular region. The methodological framework proposed by this research is illustrated in Figure 11.

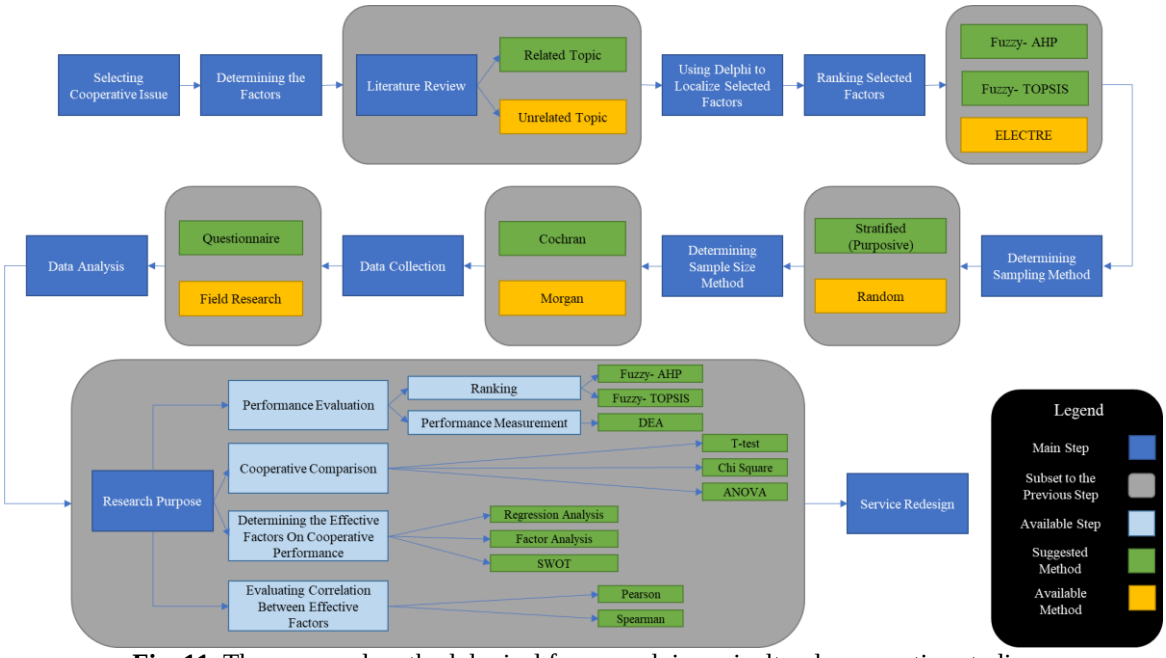

Fig. 11. The proposed methodological framework in agricultural cooperative studies

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Authors Contribution

M. Zangeneh: Supervision, Conceptualization, Methodology, Revision.

M. Bamdad: Drafting, Validation, Visualization, Text Mining.

S. H. Peyman: Supervision and Technical Advice.

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تدوین چارچوب روش‌شناختی برای مطالعات تعاونی‌های کشاورزی- مروری نظام‌مند توسط پریسما

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چکیده

تعاونی‌های کشاورزی به‌طور گسترده در جهان به‌عنوان یک نهاد برجسته در بخش کشاورزی شناخته می‌شوند. موفقیت تعاونی‌های کشاورزی در تولید و عرضه مواد غذایی تفاوت قابل‌توجهی را در کشورهای مختلف نشان می‌دهد. هدف این تحقیق بررسی جامع مطالعات موجود درباره تعاونی‌های کشاورزی با استفاده از روش پریسما است. یک چارچوب روش‌شناختی نیز برای هدایت تحقیقات آینده پیشنهاد شده است. در ابتدا، تجزیه و تحلیلی کامل از چهار بخش از هر مطالعه، از جمله اهداف، روش‌شناسی، عوامل مورد مطالعه و یافته‌های کلیدی انجام شد. متعاقب آن، متغیرهای درون هر بخش برای تسهیل تحلیل مقایسه‌ای جامع‌تر، طبقه‌بندی شدند. بررسی‌ها نشان داد که موفقیت تعاونی‌های کشاورزی منوط به مدیریت مؤثر، استراتژی‌های بازاریابی موفق و اعضای متعهد است. آموزش صرف‌نظر از سن یا جنسیت افراد از اهمیت بالایی برخوردار است. در نهایت، استراتژی‌های دستیابی به موفقیت ممکن است در میان تعاونی‌های مختلف متفاوت باشد. توصیه می‌شود که برای به‌دست‌آوردن اطلاعات دقیق در مورد وضعیت یک تعاونی کشاورزی در یک منطقه خاص یا در شرایط خاص تحقیقات هدفمند انجام شود.

واژه‌های کلیدی: ارزیابی عملکرد، تعاونی، تعاونی کشاورزی، خدمات کشاورزی، مشارکت اعضا

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