

Digital Transformation and Sustainability in Cooperatives Enterprises: A Literature Review

Gian Luigi Core

University "G. d'Annunzio" of Chieti-Pescara
Chieti, 66100, Italy

gianluigi.core@unich.it

Gianluca Antonucci

University "G. d'Annunzio" of Chieti-Pescara
Chieti, 66100, Italy

gianluca.antonucci@unich.it

Michelina Venditti

University "G. d'Annunzio" of Chieti-Pescara
Chieti, 66100, Italy

michelina.venditti@unich.it

Antonio Gitto

University "G. d'Annunzio" of Chieti-Pescara
Chieti, 66100, Italy

antonio.gitto@unich.it

Abstract

In recent years, the relationship between digital transformation and sustainability has been widely discussed by scholars in various organisational contexts and disciplines.

This study is concerned with analysing these two concepts in the context of cooperative enterprises.

The interest in investigating Digital Transformation and sustainability arises from the way cooperatives strive to achieve their goals, which often differ significantly from those of public and for-profit enterprises.

The objective of this research is, therefore, to develop a literature review that discusses the digital transformation and sustainability of cooperatives, identifying their main characteristics and providing some insights for future research.

This research highlights aspects related to the cooperative sector and proposed an additional lens to analyse the phenomena of digitalisation and sustainability.

Keywords: Cooperatives, Digital Transformation, Sustainability, Literature Review.

1. INTRODUCTION

Digital transformation (DT) and sustainability have become hotly debated topics among scholars of different disciplines, especially information systems (IS) (Vial, 2019), management (Sjodin, & Parida, 2020) and marketing (Alavi & Habel, 2021), just to mention a few.

One of the reasons why these two issues are at the centre of public debate and at the top of the agendas of many governments (European Commission, 2020; United Nations, 2020; World Bank, 2020) is that they have the potential to radically transform the organizational and management practices of companies, profoundly influencing the competitiveness and in some cases the survival of companies themselves (Grant et al., 2014).

DT initiatives are often addressed as a technology-related phenomenon (Wessel et al., 2021), aimed at promoting organizational change (Clohessy et al., 2017; Heilig et al., 2017) or further developing business opportunities (Desmet et al., 2015; Ferraris et al., 2019; Nwankpa and Roumani, 2016).

The broad literature interest in DT is evidenced by the considerable number of papers and studies that for example investigate implications related to industry (Chanas et al., 2019; Wiesböck et al., 2017) or develop theoretical frameworks and maturity models (Matt et al., 2015; Thordsen and Bick, 2020; Wessel et al., 2021).

Matthew et al. (2015) in their work state some typical characteristics of DT, regardless of specific industries or organizational forms, that seem relevant for analysing DT strategies in enterprises.

In their work Matt et al. develop four dimensions of the use of DT strategies: use of technologies, changes in value creation, structural changes, and financial aspects.

Sustainability is a broad concept not limited to environmentalism. It indeed also embraces economic and social aspects (Ford and Despeisse, 2016).

In the field of academic research, many works aim to give a definition and conceptualization of its three pillars: environmental, economic, and social (Ford and Despeisse, 2016, Kamble et al., 2018). Environmental sustainability is primarily concerned with maintaining the balance between the consumption and replenishment of natural resources and ecological integrity (Glavič and Lukman, 2007). Economic sustainability is concerned with long-term economic growth while preserving environmental and social resources. Therefore, growth in economic capital should not come at the expense of diminishing natural or social capital. Social sustainability can be defined as the process of recognizing and especially managing the impacts market and technological development have on people. The goal of social sustainability is to create healthy, liveable communities in which everyone is protected from discrimination and has access to universal human rights and basic services, such as security or health care (Dempsey et al., 2011).

Traditionally, cooperatives are identified as an alternative to the classic profit-oriented enterprises and corporations, overcoming the limits of a prevailing orientation towards financial and economic gain (Zamagni, 2015).

Their business model is people-centred, and they are owned, controlled, and managed by and for their members to meet their common economic, social, and cultural needs and aspirations.

Nevertheless, the growing attention of scholars on issues related to digitalisation and sustainability, scientific production on these issues related to the cooperative business model is still underdeveloped.

One reason could be identified in the theoretical and methodological difficulties linked to the peculiarity of the cooperative system, which typically limits the development of research in this specific organizational form (Herman, 1990).

This difficulty is expressed in having a clear and shared classification of the forms and activities of the cooperative sector among the various countries due to the different ideological, cultural, and regulatory connotations (Run, 2010).

Indeed, the basic point is that their purpose is not exclusively profit-oriented, but to guarantee what scholars define as the Principle of Reciprocity which characterizes cooperatives in the way they pursue their objectives. Thus, Cooperatives reinvest their profits to pursue purposes of social utility (Bois et al., 2003) or for collective goods and services of mutual benefit. Given the growing affirmation of both sustainability and digitalisation, COOPs could develop new DT and sustainability processes, considering the large-scale changes allowed by the pervasiveness of

digitalisation, also covering new roles that require the exploitation of digital capabilities (McNutt et al., 2018).

This aspect is interesting because, stating that the mutualistic principle underlies the existence of cooperatives (COOPs), we assume that COOPs operate on a different basis than other organizational forms. That is why it is interesting to investigate if and how they are dealing with sustainability aspects considering that literature suggests that cooperatives can play a fundamental role in achieving Agenda 2030 SDGs (Lafont et al. 2023). On the other hand, studies of digitalisation processes have mostly focused on large firms (Ribeiro-Navarrete et al., 2023) setting aside peculiar realities as cooperatives, while firm context and firm size matters are fundamental in investigating digital maturity (Ardito et al, 2021a).

All the above considered, this study intends to investigate if and how cooperatives are dealing with the issues considering that they should be in the vanguard of sustainability issues while they might have not a so prominent digital maturity.

That is why this research aims to analyse the level of development of both sustainability issues and digitalisation in cooperatives, as well as the relationship between them in cooperative businesses, guided by the following research question:

RQ How do cooperatives approach the adoption of digital transformation (DT) practices while addressing sustainability challenges, and what strategic approaches, theoretical frameworks and empirical evidence can inform this integration within cooperative contexts?

To address this inquiry, we undertake a literature review that delves into key aspects concerning the intersection of digital transformation and sustainability within cooperative contexts. It aims to identify strategic characteristics and traits discussed in the academic literature.

The structure of this article is delineated across five sections. The following section provides an overview of the background pertaining to cooperatives and the discourse on sustainability/innovation as discussed in the academic literature, followed by a delineation of the theoretical framework. Subsequently, the following section expounds upon the research methodology, elucidating the sampling and data collection methods employed. The fourth section encompasses the presentation of data analysis and results pertinent to the study hypotheses, and it is followed by an analysis upon the resulting literature. Lastly, in the concluding one we propose future research avenues concerning the cooperative model and the intersections of sustainability and digital transformation.

2. THEORETICAL BACKGROUND

A “cooperative” is a collective organization jointly owned by its members (its governance is under the control of its members) that provides goods and services and generates profits (Heras-Saizarbitoria, 2014). Profits are not distributed to shareholders in the form of dividends as in traditional companies, but are controlled by shareholders, who democratically decide how they should be used and invested. Therefore, we can say that cooperatives have a peculiar governance and business model that combines global orientation with attention to the community in which they operate, balancing mutuality with the economic objective (Zamagni 2015, Poma, 2006). Traditionally, cooperatives are identified as alternatives to classic profit-oriented businesses and companies, overcoming the limits of a predominant orientation towards financial and economic profit (Zamagni, 2015).

In the literature it is possible to distinguish two different approaches in the study of cooperatives: the vision developed in the 90s in the USA (Salamon & Anheier, 1996) characterized by a static approach and based on the criterion of non-distribution of profits regardless of the presence or absence of tax benefits and collaboration with public entities, which effectively excludes cooperatives and mutuals from third sector entities (Defourny, M Nyssens, 2022). The other

school of thought refers to the European network EMES (Émergence des entreprises sociales), which, while recognizing the work of US scholars, develops a more analytical approach by focusing on the different types of non-profit organizations and underlining the different ways of acting which have followed one another over time (dynamic historical approach). Unlike their foreign colleagues, EMES scholars include cooperatives and mutuals in third sector institutions. They argue that the constraint of non-distribution of profits cannot be taken into consideration since many cooperatives and mutual societies do not distribute profits or, if they do, they do so in a limited way (Defourny, M Nyssens, 2010). According to this approach, cooperatives are not created to maximize return on investment but rather to satisfy a general or reciprocal interest, contribute to the common good, or meet social demands expressed by certain segments of society (Laville, Defourny, M. Nyssens, 2022).

The dynamic historical approach, taken here, assumes that to fully analyse and understand the role of cooperatives and the third sector, it is necessary to analyse their evolution in different historical contexts, given that their structure has been influenced by and has influenced different spheres.

To summarise, the main features of the European approach are: (i) the inclusion of an analytical approach that develops typologies and organisational changes with an emphasis on the development of their economic dimension; (ii) the criterion of limits to the private acquisition of profits (inclusion of cooperatives and mutual benefit societies). This type of approach is useful for better understanding the role of cooperatives in the third sector. In fact, by analysing the evolution they have undergone throughout their history, it is evident that in the last century cooperatives, born to satisfy the needs of their members, have developed mechanisms that have led them to act in a manner not dissimilar to for-profit enterprises, which is why in many countries there is consensus in not including them in the concept of the third sector. However, by fully analysing the path developed by these organizations, especially in Europe, over the past thirty years, one can see how new cooperative forms have emerged in sectors such as personal services that rely on market resources (e.g., Italian social cooperatives), but operate based on public subsidies or outsourcing contracts.

For these reasons, differentiations with respect to whether they belong to the third sector should not be made based on legal form (Anglo-Saxon approach) but by considering the different roles and functions performed by the various types of coops (European approach).

Again through an analysis of the literature it is possible to identify some of the characteristics shared by the doctrine on cooperative enterprises: (i) Institution (or organisation that may or may not be formally or legally constituted), (ii) Private (institutionally separate and not controlled by government), (iii) Self-governing (able to control its own activities without operational control by any other entity, private or governmental), (iv) Non-Profit Distributing (a legal prohibition is imposed on the members of any organisation or other interested parties from receiving any share of the surplus generated by the organisation's activities) and (v) Non-Compulsory (i.e. involving some significant degree of unforced individual consent to participate in their activities)- (L.M. Salamon, M.A. Haddock, S. Toepler, 2023).

cooperatives tend by their nature to work for the sustainable development of their communities and to rely on the values of self-help, personal responsibility, democracy, equality, and solidarity (Battaglia et al., 2020;). The set of principles according to which cooperatives operate is closely linked to the principles of Corporate Social Responsibility (CSR) (Battaglia et al., 2016). In fact, as underlined by the European Commission (2002, p. 10), "cooperatives [...] have a long tradition in combining economic sustainability with social responsibility. They ensure this through dialogue with interested parties and participation.

It is therefore possible to argue that cooperatives are inherently inclined to pursue economic, social, and environmental sustainability (Battaglia et al., 2020; Imaz and Eizagirre, 2020).

Some studies focused on the situation present in a specific country, while confirming the attitude of cooperatives towards sustainability, do not explore their propensity towards sustainable innovation. We can refer, for example, to the studies conducted in Spain by Garcia on the potential of Spanish tax policies for cooperatives to stimulate sustainable development (Garcia et al., 2020), or to Fernandez-Guadaño who compared the business model of cooperatives with that of traditional businesses, presenting how the former can be more aligned with the SDGs and more ready towards a more equitable distribution of the value created (Fernandez-Guadaño et al., 2020). In Germany, Terlau studies how the governance model of cooperatives can, together with other variables, promote sustainable development in small farms (Terlau et al., 2019).

The widely accepted definition of 'sustainability' in academia, professional circles and decision-making processes was formulated by the UN Brundtland Commission in 1987. This definition characterises sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Stuermer et al., 2017). Banerjee (2003) notes that this definition is often used interchangeably with sustainable development.

However, scholars such as Moldavska and Welo (2017) and Del Río Castro et al. (2021) argue that the concept of sustainability has often been misapplied, incorporating various perspectives that dilute its true essence and hinder its achievement. The complexity of 'sustainability' stems from its multi and transdisciplinary nature, influencing socio-economic structures at all levels through actions, decisions, and behaviour (Caputo et al., 2021). Consequently, sustainability is highly dependent on stakeholder involvement in the co-creation of shared value (Chaurasia et al., 2020).

Digital transformation is a recent concept that, however, has received increasing attention in recent years from scholars and academics. According to Vial, we can define digital transformation as "a process aimed at improving an entity by triggering significant changes in its properties through combinations of information, computing, communication, and connectivity technologies".

Such a process usually generates a significant change in the involved entity by combining information technology, computing, communication, and connectivity (Vial, 2019).

Consequently, any organization wishing to develop a digitalisation process must first know its level of digitalisation, considering the consequences it could produce on the organizational system itself (Wessel et al., 2021). Choosing the strategy that guides DT initiatives is a central issue for successfully implementing the resulting organizational change (Chong and Duan, 2020; Hanelt et al., 2021) and supporting the company in governing such transformation (Hess et al., 2016; Kamm et al., 2021).

Matt et al. (2015) introduces a new concept of DT inspired by coordinating, prioritizing, and implementing business initiatives in this area by looking at the integration and consolidation of different strategic levels. They discuss some common elements that, regardless of specific organizational forms, seem relevant for assessing DT in companies.

These elements allow us to have a framework of DT composed of four dimensions: (i) use of technologies, (ii) changes in value creation, (iii) structural changes, and (iv) financial aspects (Matt et al., 2015).

In literature, digitalisation and technological innovation are often linked to sustainability (Smith et al., 2010).

For example, Information and Communication Technologies (ICT) and the Internet of Things (IoT) play a key role in promoting sustainability, improving transparency or evaluation capabilities through the contribution of big data analysis and management (Del Río Castro et al., 2021; Paiola

et al., 2021). However, according to Ardito et al. (2021b), there is no evidence that the combination of digitalisation and sustainability brings benefits to a company's performance.

Digitalisation can represent a disruptive force that, if not managed, uncontrolled, or underestimated, can have negative consequences for the sustainable development of a company (Andriushchenko et al., 2020; Carnerud et al., 2020; Flyverbom et al., 2019). Aksin-Sivrikaya and Bhattacharya (2017) develop sustainable governance models that can reduce friction between digitalisation and sustainability and increase opportunities.

3. RESEARCH METHOD

With this study we seek to develop a literature review that can identify key variables and relationships that summarize how DT and sustainability initiatives in cooperatives are discussed in the literature.

Consistent with other literature review, we developed a classification framework to ensure each article assessed consistently and comprehensively (Durst et al.2015; Tell et al. (2016)).

First, papers were extracted from SCOPUS according to a set of keywords and publication dates (Broadbent and Guthrie, 1992; Massaro et al., 2016).

We complemented this approach with a traditional method for literature selection, using a set of inclusion criteria (Ardito et al., 2015) to draw in relevant articles missed in our initial search manually. We based the search on SCOPUS database as it is widely employed by academics and practitioners (Donthu et al., 2020). Considering the two different edges of sustainability and DT in COOPs, being the former a forefront issue and the latter an aside one, we decided to consider firstly the two issues within COOPs to then investigate for any double relation. Therefore, as an initial search based on the search string “cooperative” AND “digitalisation” OR “sustainability” in the title and abstract papers fields. Our initial dataset comprised 1842 contributions. We refined the search electing only articles from scientific journals in the last teen years (2013-2022). Moreover, noting different languages used for some contributions (i.e., Spanish (3), Chinese (2) German (2)), we considered a second exclusion by setting the language parameter as “English”¹. We considered as a valid timespan 10 years thus considering the period 2013- 2023. This choice was made after a reflection upon the specific focus of our research. First of all, we considered the “Turing point” of sustainability as that inspiring Agenda 2030, thus considering two years before 2015, but most of all, since the work by Kraus et al. (2022) upon digital transformation in business and management research found nearly no publication before 2013 finding an “explosion” after 2016. As a result, the refined dataset includes 324 contributions, last updated in late 10 June 2023. We have focused search exclusively on published articles, discarding all other types (book chapters, books, etc.) from the published literature. Relying on published literature is not without risk, as only a comprehensive search is associated with limiting the potential for publication bias (Kepes, Banks, McDaniel, & Whetzel, 2012; McDaniel, Rothstein, & Whetzel, 2006). However, the advantages of excluding unpublished articles involve increased scientific rigor from a peer-reviewed publication process.

Finally, the category selection filter was used, and the category of Economics, Business, Management, was selected (Ribeiro-Navarrete et al. 2021).

We decided not to consider articles from publications not included in our journal quality list (AJG2021).

We manually worked individually to assess each article before comparing our results to minimise subjectivity and bias. In the first stage, the authors read the title and abstracts. If insufficient

¹ We therefore considered the correct term “digitalisation” and not the spelling “digitalization” as written in what it is called America English by Microsoft Word.

information was available from these, then the entire paper was read. Moreover, the authors worked alone and later compared their results to minimize subjectivity and bias (Paoloni et al., 2020). This process was followed throughout the codification of the articles analysed in this document. This reduced the overall sample to 97 articles out of 1842 initial submissions.

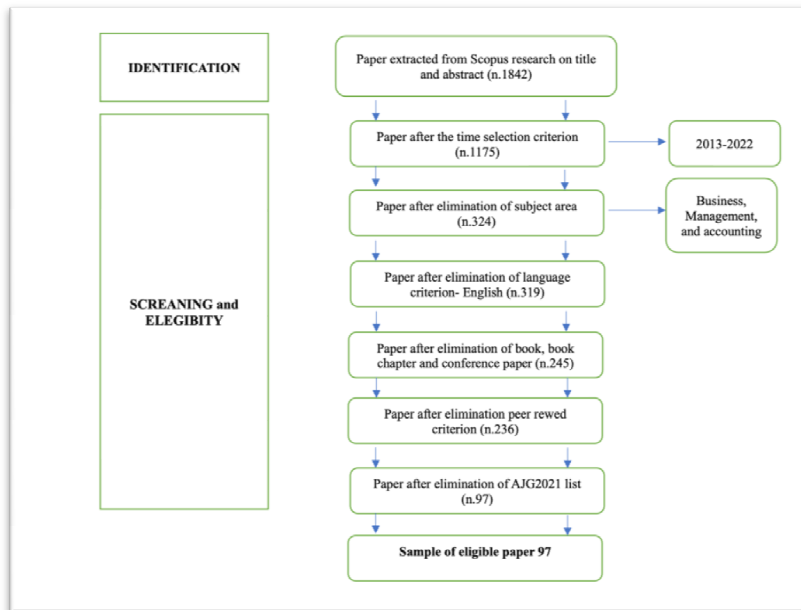


FIGURE 1: Research and definition of eligible paper.

4. RESULTS OF ANALYSIS

4.1 Distribution of Publications Over Time

The distribution of publications over time clearly shows a boost in the interest of the scientific community in digitalisation and sustainability in recent years. Exploring our dataset, we noticed that a significant number of scientific contributions have been published mainly in the last 5 years (with almost 79% of the results), showing a growing interest in DT and sustainability phenomena in the context of COOPs.

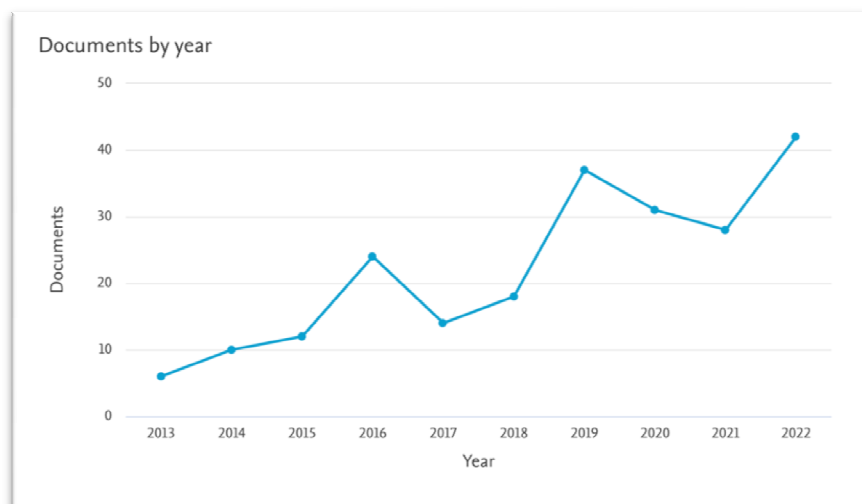


FIGURE 2: Number of publications per year relating to DT and sustainability in COOPs since 2013.

4.2 Distribution of Publications between Journals

We analysed the source of publications using the recently published AJG2021–Academic Journal Guide– (Walker and Wood, 2021). This guide ranks journals in one of five categories (e.g., 4*, 4, 3, 2, 1 where 4* is the top-level) distributed into twenty-two different fields of study (Rahal and Zainuba, 2019). The most productive journal is Journal of Cleaner Production, with 43 out of 97 articles (44%) followed by Journal of Cooperative Organization and Managements (8 papers; 8,43). Follow International Journal of Scientific and Technology Research, Technological Forecasting and Social Change, Transportation Research Part E Logistics and Transportation Review (4 papers; 4,12%).

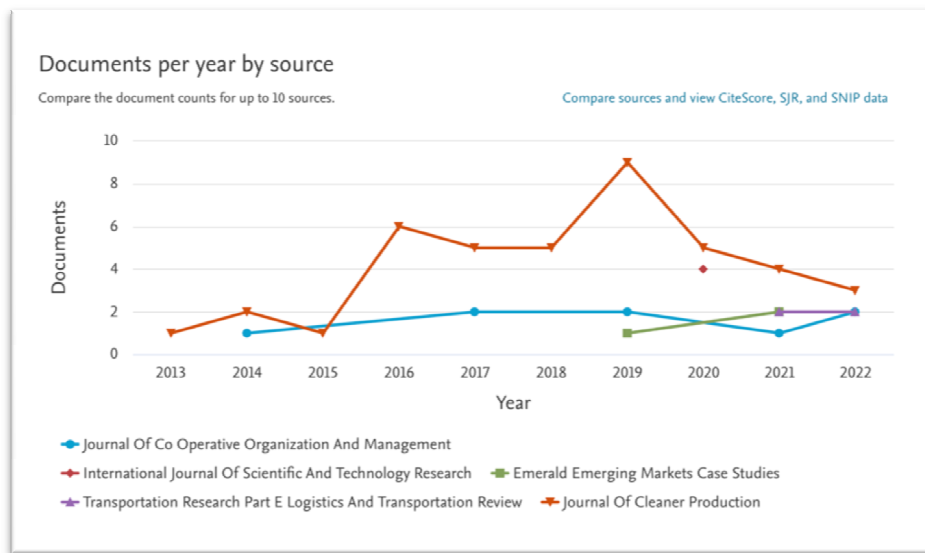


FIGURE 3: Documents per year by source.

4.3 Geographical Focus

Analysing the geographical context, we found that the largest concentration of articles came from the European continent (50 articles) and the United States/UK (24 articles), i.e., the two geographical areas where the two main schools (EMES and Anglo-Saxon school) that have studied and analysed the cooperative model over the last forty years were born and developed. Together, these two groups account for about 76% of the papers analysed, showing little attention to issues related to the cooperative model on the part of scholars from other geographical contexts.

As mentioned, this is explained by a greater tradition and rootedness of the cooperative model in continental Europe and the United States/UK, compared to other countries where the cooperative model is little practised or is conceived in a broader context: that of NGOs (non-governmental organisations).

Moreover, an element that characterises the literature examined is the marked regionalisation of the studies: in fact, if we look specifically at the different contributions, we discover that many of them analyse the issues of sustainability and digitalisation in a specific territorial context (e.g., the Basque region or the Skene region in Sweden or Dutch Flanders).

This phenomenon is even more evident in contributions from the European context than in those from the Anglo-Saxon world, which are more oriented towards providing an international definition of the different realities that fall within the community of non-profit organisations.

The analysis of the third sector and cooperatives according to the European approach is based on the consideration that different traditions and consequent study approaches have contributed to the development of this sector in different forms and ways.

These definitions and approaches are summarised in the following five interpretative models (Defourny, Hulgård, Pestoff, 2014):

- i. The philanthropic tradition (charities, charities community sector, etc.) is particularly active in the United Kingdom and Ireland.
- ii. The Scandinavian tradition characterized by civic engagement with the community to promote equality and democracy.
- iii. Northern European: typical of countries such as Germany, Belgium, and Holland, based on the principle of subsidiarity and closely linked to ecclesial initiatives.
- iv. Cooperative/voluntary: characterized by a common civic background of promoting participation and democracy (Denmark, Sweden) or by a common religious inspiration (Italy, France, Belgium).
- v. social tradition: the role assigned to the family in countries such as Italy, Spain or Portugal has had a great influence on the evolution of problems related to the third sector and cooperatives, especially regarding the provision of personal services.

4.4 Main Methodologies and Theoretical Approach

In terms of research methodology, qualitative method was most used, which was used in 57 of the articles. Of these articles, 22 relate to a single case study, 15 use comparative case studies and 20 adopt multiple case studies. Additionally, 23 articles among our sample rely on quantitative methods, 10 are based on mixed methods. Only 7 articles are literature reviews (Bonollo, 2019; Hay and Cordery, 2018).

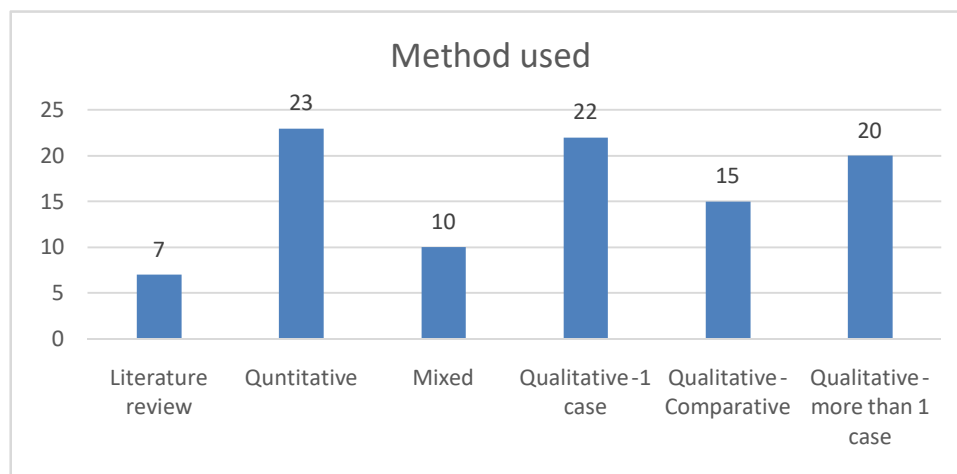


FIGURE 4: Method used in articles.

In terms of grounded theories, only 25 percent of the articles (24 out of 97 studies) are explicitly based on established theories. The dominant theories are the dynamic capabilities approach (7 articles), the resource-based view (5 articles) and evolutionary theory (5 articles).

The basic idea is that being disruptive forces, digitalisation and sustainability have enabled firms "to conceive and design new resource configurations" (Amit & Han, 2017).

The rest of the articles analysed are based on complementary theories, namely the knowledge-based view (3 articles), the competency-based view (1 article), organizational learning (1 article), or alternative theoretical approaches, namely institutional theory (1 article) and transaction cost economics (1 articles). Overall, the prominent role of resource- and capability-based theories over

institutional theories aligns perfectly with the idea that the increasing pace of DT and sustainability increasingly requires valuable intangible resources (e.g., knowledge), capabilities, and competencies.

5. LITERATURE REVIEW

In line with previous studies, which included both a bibliometric analysis and a systematic literature review, the final part of this study involves a systematic review of the 97 selected articles (Rialti et al 2022).

Our literature review reveals an inclination among scholars to analyse the topic of digitalization in the agriculture and energy sectors (Clapp & Ruder, 2020; Beishenaly, N., & Dufays, 2021). Specifically, the research emphasis lies in understanding the use, accessibility, and environmental, social, and political ramifications of digital technologies in agriculture. The discourse on Energy Communities (EC) has been widely discussed recently, favouring the cooperative model as the optimal approach to advance this innovative model of renewable energy production, distribution, and consumption. Energy communities (ECs) empower end-users of energy by granting them an active role in the energy market, promoting the use of renewable energy sources, and improving efficiency (Lode et al., 2022).

Various publications address the topic of "Industry 4.0", delving into the meaning and trends linked to the term and focusing on aspects linked to sustainability and digitalisation in cooperatives. Scholarly attention is mainly focused on production and the supply chain (Lafferty, 2019). Furthermore, it is noted that when talking about industry or sector, the articles become much more strategic than descriptive (Holmstrom et al., 2017). Among these, Chen et al. (2015) and Lee et al. (2019) explicitly state that digital innovation represents one of the most developed issues in the manufacturing sector and, according to the authors, digitalization has a positive effect on the development of sustainability if the challenges of social and technological changes are addressed. Furthermore, the survey highlights in several publications the value of digital information, as well as the effects and path towards digital learning (e.g. Chowdhury, 2016). The articles also explore the potential of digitalization towards sustainable urban development, especially considering trends and reaction to events (Balogun et al., 2020; Zheng et al., 2020).

When considering the strategic role that digital technology can play in improving sustainability, one of the most recurring themes is that of the Sustainable Development Goals (SDGs) contained in the 2030 Agenda. In this regard, Mondejar et al. (2021) highlight the different opportunities offered by digitalisation for achieving the SDGs. The role of cooperatives in contributing to the achievement of the SDGs, and sustainability more generally, seems neglected by academic production or only touched upon at a high level (e.g. George et al., 2020).

However, much of the research addresses the opportunities that digitalisation offers for sustainability as part of a business strategy in a new era of scientific and technological progress (Andriushchenko et al., 2020; Ghobakhloo, 2020). Some articles, in fact, propose business models to guide and manage the strategic application. In this context, academic articles adopt a sectoral approach, as seen in the work of Gregori and Holzmann (2020), who delve into the concept of value creation, and Andriushchenko et al. (2020), which aim to predict the evolution of digital transformation and mitigate the associated risks. Interestingly, many studies investigating the strategic relationship between digitalisation and sustainability focus on narrow geographic areas. This is sometimes highlighted in the title (e.g., Alakeson & Wilsdon, 2002; Beier et al., 2017; Singh et al., 2021), but in most cases it emerges clearly from the content.

Furthermore, in the selected literature, many digital technologies and capabilities have been discussed, but the main ones can be summarized in the following order:

a) Big Data

The big data are recently becoming the “new oil”, the new form of wealth that fuels the age of information and digital economy (ElMassah et Mohieldin, 2020). According to the selected literature, there are two main aspects of this phenomenon:

- i. Sustainability
- ii. Sustainable IoT

Regarding the first aspect, by improving transparency and communication, big data can drive and monitor sustainability on a large scale (Seele 2016). Moreover, big data allows stakeholders to observe the performance of cooperatives and companies about sustainability. However, one aspect to highlight is the lack of a regulatory and theoretical framework capable of monitoring and sanctioning potentially harmful activities.

Sivarajah et al. (2020) highlight the integrative role of social media and big data in improving sustainability, particularly with specific functions such as marketing. Regarding the topic of sustainable IoT, however, big data is often addressed in relation to the concept of Industry 4.0 (now 5.0) and digital manufacturing (Lafferty, 2019).

b) ICT (Information and Communication Technologies)

The world is currently in the fifth Industrial Revolution. Innovations in information technology (ICT) and digital devices have led the enterprises towards a new emerging paradigm of digital transformation, which presents a strategy-oriented changes in infrastructure and processes based on current information and communication technologies (ICT) (Pihir, 2018). ICT is the most discussed topic in terms of functionality. Part of the literature addresses the strategic use of ICT by cooperatives and enterprises in general, by analysing the social issue of the digital divide (Armenta-Ramade et al, 2011; Hidalgo et al., 2020). Furthermore, the topic of social media and digital media is discussed by scholars and practitioners (Liu, 2016; Nulman et O'zkula, 2016), just as the topic of information is often linked to the library sector and learning activities (Anthonysamy et al, 2020; Blau et al, 2020).

c) Digital twin

Another much-discussed topic in the literature is the concept of the digital twin. Recurring themes are the use of the digital twin in manufacturing (Li et al., 2020; Park et al., 2020) or automated vehicles used in the supply chain (Bechtsis et al., 2017, 2018). Allam and Jones (2021), on the other hand, address the role of the digital twin in urban development, explaining how this technology enables the understanding and thus development of future sustainable cities. Finally, He et al. (2021) propose a data processing model for smart sensing robotics aimed at achieving sustainable development goals.

6. CONCLUSION

This article endeavours to enrich the discourse surrounding Digital Transformation (DT) and sustainability, concentrating specifically on the context of cooperatives. Through a detailed exploration, it addresses the distinctive considerations and challenges faced by cooperatives as they navigate the adoption and integration of DT practices while concurrently fostering sustainability. The inquiry incorporates a thorough literature review, encompassing an analysis of 97 peer-reviewed articles. This review contributes insights into the strategic approaches, theoretical foundations, and empirical findings related to the convergence of DT and sustainability within the framework of cooperatives. By examining these aspects, the article aims not only to advance academic understanding but also to provide practical implications for the successful coalescence of DT and sustainability in cooperative settings. Furthermore, it lays the groundwork for potential avenues of future research in this dynamic and evolving domain.

Based on the analysis presented in this study, a prevalent orientation in the scientific literature emerges, approaching the themes of Digital Transformation (DT) and sustainability not merely as

tools or processes aimed at capital accumulation or profit maximization (as seen in the North American approach). Rather, the literature tends to consider them more broadly as novel means of affirming the distinctive features of the cooperative model, with a particular emphasis on the mutualistic purpose (aligned with the European-EMES approach). This nuanced perspective underscores a shift in focus from mere economic gains to a more holistic understanding that integrates social and environmental dimensions, reflecting the cooperative ethos and reinforcing the cooperative model's intrinsic values.

Through engagement with digitalisation, the cooperative enterprise has the potential to fortify itself and assert mutualism as a developmental model for the economy, society, and individuals. In cooperative businesses, digital transformation extends beyond mere efficiency and innovation, encompassing a commitment to reinforcing and enhancing the concept of mutual agreement. In this context, digital transformation, rather than solely representing the transition from analogue methods, assumes a pivotal strategic role in advancing the social and solidarity economy. Its role is crucial in ensuring market pluralism and mitigating the risks associated with monopolization. This perspective underscores the transformative capacity of digitalisation within cooperative frameworks, positioning it as a key driver for fostering economic, social, and communal well-being.

Another prominent aspect evident in this research is the literature's inclination to characterize the digital transformation process as a formidable catalyst for the attainment of sustainable objectives within cooperative enterprises. The prevailing discourse underscores the transformative potential of digitalisation in not only enhancing operational efficiency and innovation but also in significantly contributing to the realization of sustainability goals. This perspective highlights the role of digital transformation as a powerful enabler for cooperative enterprises to align with and advance sustainability objectives, thereby reinforcing the symbiotic relationship between digitalisation and sustainable practices within the cooperative paradigm.

Obviously, this concept requires greater awareness and familiarity on the part of cooperatives with the tools or new technological means which, if not managed properly, can represent a boomerang in terms of efficiency and growth.

To achieve success in this transformative process, cooperatives must comprehensively grasp and address the barriers and obstacles inherent in their business models, particularly concerning solvency, efficiency, and operational processes. The implementation and adoption of technologies requires cooperation among members to ensure the efficient adoption of any technology. In a cooperative where decisions are made democratically, this process can represent an obstacle to the successful adoption of digitalisation (Martínez et al. 2022). Our results demonstrate that digitalisation is increasingly linked to new forms of technology such as Big Data, ICT and Digital Twin. These three concepts are used in many companies to optimize their strategies or improve their products and services. Furthermore, in line with Kraus et al. (2019), we found that sustainability plays a key role not only in the production processes and strategies implemented by companies, but also in new business models and entrepreneurial projects (Ho et al. 2022; Debbarma et al., 2022). Sustainability constitutes a foundational pillar of the cooperative movement's ethos and historical trajectory, as their initiatives are inherently sustainable and environmentally conscious. Moreover, their products and services are typically intertwined with sustainable elements and social initiatives (Ben-Ner and Ellman, 2013).

Research on the correlation between digital transformation and sustainability has underscored several gaps that necessitate further investigation. These include the pronounced fragmentation across sectors, functions, and methodologies, as well as the limited availability of information concerning cooperative enterprises. Additionally, a notable divergence exists between the terminologies employed by scholars and industry practitioners, impeding broader collaborative efforts on the subject.

In recent years, new challenges have emerged for sustainable development and digitalisation. These challenges cover issues such as climate change, the use and exploitation of natural resources, the digital workforce, (gender) inequality, sustainable development, and major social challenges (George et al. 2016). Research questions that deserve attention from scholars in this area concern how these challenges affect cooperative enterprises and how they can or should respond to them. Such challenges open new avenues to explore as we seek to adapt organizational structures, corporate governance regimes and necessary organizational changes.

However, this work has some limitations, which need to be contextualized and acknowledged to further address them in future research. First, the choices made in a systematic literature review can be questioned in several ways. For example, the sample selected is highly dependent on the search keywords and restrictions applied.

The same reasoning applies to the quality criteria applied, which may exclude important studies despite the intent to ensure high academic standards of results.

While the approach adopted in this research is motivated by the recognition of a conspicuous gap in the literature pertaining to the relationship between digital transformation and sustainability within the cooperative sector, it is imperative to acknowledge that an equally important avenue for inquiry would involve conducting specific case studies to analyse these questions. Such case studies would offer a more granular exploration, providing detailed insights into the nuanced interactions between digital transformation initiatives and sustainable practices within individual cooperative enterprises. By delving into specific cases, researchers can gain a more comprehensive understanding of the contextual factors, challenges, and successes that characterize the integration of digital transformation and sustainability in cooperative settings. This dual approach, combining broad literature reviews with focused case studies, has the potential to offer a more robust and holistic perspective on the subject, contributing to a more thorough comprehension of the dynamics at play within the cooperative sector.

Ultimately, this study merits recognition for its acknowledgment and revival of the theme of digitalisation in the pursuit of sustainability within the cooperative sector. The literature review revealed a notable lag in the development of this topic. With this study, there is an aspiration to rectify this imbalance by contributing to the body of research on the intersection of digital transformation and sustainability in cooperative enterprises. By shedding light on this vital but somewhat overlooked area, the study seeks to catalyse a reevaluation and reintegration of the subject within the scholarly discourse. It is our hope that this research will not only fill existing gaps but also prompt a renewed emphasis on the significance of digitalisation for sustainable practices in cooperative contexts, fostering a more comprehensive understanding within academic circles.

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