Primary submission: 31.07.2023 | Final acceptance: 18.12.2023

An Investigation of the Critical Factors That Influence Knowledge Mobilization Success in Agri-Food Supply Chains

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ABSTRACT

Agri-food supply chains (AFSCs) are essential for addressing global food security and promoting the United Nation's Sustainable Development Goal of reducing hunger. These chains stand out because they deal with perishable goods that have limited shelf life and are subjected to erratic agricultural situations, such as fluctuating weather. To preserve sustainability and competitiveness, innovative approaches such as cross- border knowledge mobilization are essential for effective AFSC management. To identify the elements essential to effective knowledge mobilization within AFSCs, this study explores the dynamics of this process. Eleven potential critical success factors (CSFs) are identified and analyzed by using questionnaire surveys to collect extensive data from AFSC practitioners. The results of a multiple regression analysis show that eight of the identified criteria are strongly correlated with knowledge mobilization success. Notably, two parameters show negative correlations, indicating intricate interactions in the dynamics of knowledge. The study's findings highlight the value of strategic knowledge management for increasing the efficacy and efficiency of AFSCs and advancing the larger objective of sustainable food security. This research advances the goal of eliminating world hunger by exposing the complex effects of these CSFs and offering practitioners and policymakers useful insights for enhancing AFSC operations.

KEY WORDS: Knowledge mobilisation success, knowledge boundaries, agri-food supply chains, critical success factors.

JEL Classification: Q16.

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1. Introduction

Agri-food supply chains (AFSCs) have received considerable attention because of their key role in achieving the United Nation's Sustainable Development Goal of reducing hunger. The efficacy of these supply networks is largely dependent on the perishable nature and seasonal unpredictability of agricultural products, which also have a direct bearing on international efforts to reduce hunger. The capacity of AFSCs to handle these particulars properly is essential for guaranteeing reliable food availability and accessibility, especially in areas where food scarcity is possible. However, several changes have occurred in this sector over the last decade. First, demographic developments (i.e., aging populations, higher numbers of double-income families) have made consumers more interested than ever in having fresher food with higher added value. Second, as a consequence of globalization, new competitors and stricter regulations and laws for food safety and environmentally friendly production have increased the demands on management. Kumar et al. (2022) examined the difficulties

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that globalization presents for AFSCs in

detail, including the introduction of new rivals and tightening of laws pertaining to environmentally friendly production and food safety. They emphasized that for AFSCs to remain competitive in this increasingly globalized world, they must create more creative and adaptable management techniques. This is consistent with our study's focus on knowledge mobilization because addressing these global difficulties increasingly depends on the ability to manage and exchange knowledge across the supply chain. Considering demographic shifts including population aging and the development of dual-income households, Liguori et al. (2022) investigated changing consumer preferences, drawing attention to the rising demand for fresher and more valuable food goods and emphasizing the need for AFSCs to adjust to these shifting consumer demands. This change has important ramifications for knowledge mobilization in AFSCs, as supply chain activities must be in line with changing market trends and timely and pertinent information is crucial. Moreover, compared with other types of supply chains, AFSCs have several special features that require special attention from a management perspective. For example, the products flowing through AFSC are usually perishable, have a relatively short shelf-life but a long production throughput time, and can be affected by significant constraints on availability due to seasonality (Chen et al., 2018; Stone & Rahimifard, 2018).

Thus, a typical AFSC is a complicated network comprising several entities linked from "farm to fork," including farmers, input suppliers, co- operatives, packing-house, transporters, exporters, importers, wholesalers, retailers, and ultimately consumers (Zhao et al., 2022). However, as human civilization continues to develop, this network faces many challenges. For example, climate change is leading to extreme weather events such as floods and droughts, which have negative effects on crop production and supply chain stability. Reduced crop yields and increased unpredictability in supply chain operations are the direct results of these extreme weather events, which are worsened by climate change. They also directly affect agricultural production schedules and supply chain logistics. These issues are further worsened by human factors such as over-cultivation and water abuse, which reduce soil fertility and water availability, both of which are essential for sustainable farming methods. These disruptions jeopardize the long-term sustainability and resilience of AFSCs and impact the immediate availability of food. Human over- cultivation and water abuse have led to soil erosion and water scarcity, threatening agricultural sustainability. Uncontrolled agricultural expansion and deforestation damage ecosystems, thereby affecting the local environment and climate. In addition, some human factors affect food quality. For example, chemical and microbial contamination in food can lead to food safety issues, while counterfeit and substandard food products and false labels undermine consumer trust. Improper transportation and

storage conditions can lead to food waste and loss. The most critical issue is that the global supply chain is connected across many countries; however, transparency and effective traceability systems are lacking, making food tracking and recall more difficult (Accorsi & Manzini, 2019; Haji et al., 2020).

The current literature presents a comprehensive perspective on supply chain innovation in the agri-food industry. Taylor and Fearne (2006) developed a framework for demand management in supply chains that emphasizes communication and cooperation. Their strategy focuses on the need to combine organizational reform and technology to improve supply chain responsiveness and adaptability. This is particularly important in AFSCs because perishable product qualities and changing market needs necessitate quick and well-informed decision-making. Aramyan et al. (2007) investigated AFSC performance assessment, highlighting important performance metrics such as food quality, responsiveness, efficiency, and adaptability. Their findings from a case study on the Dutch–German tomato supply chain offer a wide range of measures that are essential for evaluating AFSC success. Reaching these performance goals in AFSCs depends on effective knowledge flow; therefore, these indicators closely align with this study's focus on knowledge mobilization. Ganesh Kumar et al. (2017) conducted an extensive literature review on AFSC management and suggested solutions for challenges in the Indian agricultural sector, focusing on policy improvements and supply chain development. They

 DOI: 10.5709/ce.1897-9254.529

categorized the literature into four main areas: general AFSC review, policies affecting segments, individual segments of agri-food SCM, and performance of supply chain segments. They also identified various challenges in the Indian agricultural sector and suggested potential solutions, including the formation of farmer associations and co- operatives, improved marketing facilities, efficient processing centers, and enhanced transportation infrastructure, emphasizing the need for supportive agricultural policies and the development of agricultural supply chains to stimulate agricultural growth in India. Yuanita et al. (2015) have advocated for AFSC coordination and the concept of value co-creation, promoting collaboration among firms, suppliers, and consumers to enhance efficiency, profits, and innovation. Their review underscores the need for further research in this area, particularly with an emphasis on consumer requirements and the concept of value co-creation. They advocate for a shift toward involving consumers as key actors in the supply chain, promoting collaboration between firms, suppliers, and customers to enhance efficiency, increase profits, and foster innovation in processes, products, and services. Furthermore, Thien and Hue (2021) have explored blockchain technology's potential to enhance transparency and traceability in the agri-food sector, underlining the importance of strategic planning and policy recommendations for its adoption in Vietnam's agricultural sector. They noted the potential for blockchain to enhance traceability and transparency in the agri-food sector and its alignment with sustainable development goals. Their study emphasizes the need for strategic planning and policy recommendations to address challenges and promote the adoption of blockchain in Vietnam's agricultural sector. While blockchain shows promise for improving supply chain transparency, it also faces barriers to gaining wider acceptance among farmers and systems, making it essential for policies on food traceability to be formulated within the context of Vietnam's agricultural sector. This collective body of research underscores the critical roles of innovation, collaboration, and technology in the advancement of AFSCs, ultimately contributing to food security, efficiency, and sustainability.

Companies in AFSCs rely on efficient collaboration to create value. The significance of diverse approaches to collaboration in AFSCs encompasses collaborative transaction, event, and process management. These approaches offer a nuanced toolkit for managers to assess, enhance, and customize their collaborative strategies, tailored to the unique dynamics of their business relationships (SalmaAhmed, 2012). Such strategies align with the findings of Nagehan et al. (2017), who demonstrated that trust within the supply chain is pivotal for fostering supply chain collaboration and ultimately yielding competitive advantages, which affects firm performance positively. Trust, as a foundational element of collaboration, underlines the importance of establishing a trusted network of AFSC partners. In addition, Hudnurkar et al. (2014) have emphasized the role of information sharing and information technology (IT) in supply chain collaboration. Given the dynamic and electronically connected nature of today's markets, IT serves as the "nervous system" facilitating the seamless integration of supply chain partners both within and outside organizations. Thus, the reviewed literature collectively underscores the centrality of marketing strategies that leverage trust, diverse collaborative approaches, and IT-enabled information sharing to advance AFSC collaboration, ultimately enhancing performance and competitive advantages in this crucial sector.

As the AFSC is relatively long, knowledge mobilization across partners is vital, as it can shorten delivery time and quickly respond to demand. Currently, knowledge mobilization, which contributes to the effective use of knowledge and knowledge flow, has a valuable influence on AFSC management (Argote & Miron-Spektor, 2011). However, knowledge mobilization crossing supply chain stages presents many challenges, because stakeholders at different stages of the AFSC not only have different areas of expertise but also may have different levels of interest in sharing knowledge with others (Boshkasha et al., 2018; Zhao et al., 2021). Furthermore, various boundaries, such as those resulting from technological, social, cultural, and political factors, could create barriers to knowledge mobilization (Liu, 2020). The challenges and the factors that will influence knowledge mobilization need to be understood and identified to mobilize knowledge successfully crossing the boundaries.

Based on the above background, the research objectives and questions of this study are as follows

Aim of the Study:

Investigate the critical factors that influence knowledge mobilization success within the context of AFSCs.

Research Questions:

- What are the critical success factors (CSFs) in AFSCs?
- How can these factors be used to address knowledge boundaries within AFSCs?
- What are the correlations between these CSFs and successful knowledge mobilization in AFSCs?

This study uses multiple linear regression analysis to examine the predictive ability of two or more continuous independent variables (i.e., CSFs) on one continuous dependent variable (i.e., knowledge mobilization success) (Easterby-Smith et al., 2012). Thus, this analysis helps investigate the relationships between CSFs and knowledge mobilization success, and the results provide a basis for answering Research Question 3.

This study provides insights into understanding the key factors in AFSCs that will influence knowledge mobilization success. For example, this study investigates the research problem of knowledge mobilization in AFSCs, starting from identifying various factors that could create knowledge boundaries that hinder knowledge mobilization in supply chains, especially those that prevent knowledge mobilization from one stage of the chain to another, and then finding solutions in relation to the CSFs.

The remainder of this paper is organized as follows. Section 2 reviews the related literature, based on which a theoretical framework and hypotheses are presented in Section 3. Section 4 describes the research methodology and Section 5 presents the main empirical findings. Section 6 provides this study's conclusions.

2. Literature Review

The term "knowledge mobilization" is used in this study instead of other common terms (i.e., knowledge transfer, knowledge exchange, knowledge flow, knowledge sharing, knowledge diffusion) to highlight that for knowledge to be mobilized, especially in crossing-boundary situations, significant effort is required from both sides involved in the knowledge activities, including both knowledge senders and receivers. Significant effort may sometimes be required from third parties such as knowledge facilitators, who are often called knowledge spanners in the case of

crossing knowledge boundaries in supply chain stages. Through the efforts of both sides (and sometimes third parties), knowledge is not only mobilized but also improved and renewed. However, knowledge mobilization should not be interpreted as a straightforward process in which knowledge is simply passed from one to another. The knowledge seekers, requesters, or even brokers must expend significant effort and commitment to absorbing the knowledge and exercise their learning and reflection abilities to create new knowledge (Liu, 2020; Liu et al., 2019; Phelps et al., 2012).

Knowledge boundaries can be defined as differences in knowledge that result from several factors, such as differences between a farmer and a research scientist in background or education. There can also be differences between social levels or cultural values (Boshkoska et al., 2018). Recognizing and understanding knowledge boundaries is the first step to solving the problem of knowledge mobilization. The concept of knowledge boundaries is not new to supply chains. In social network analysis, then evolved to knowledge networks, researchers have identified network holes, spaces, and missing ties that create gaps that can prevent or stop knowledge sharing (Massaro et al., 2016).

However, knowledge mobilization is relatively difficult to adopt in AFSCs. The products flowing through these supply chains are highly perishable; thus, organizing complicated large-batch processes, as is the norm in industries such as automobile manufacturing, is difficult. Moreover, organizations in the agri-food industry do not appear to have a culture or tradition of sharing information and knowledge openly. They also are far behind other industries in adopting advanced techniques, such as those that can help with more accurate and real-time forecasting. This lack of precise forecasting has been identified as a serious cause of the waste between suppliers and retailers (Mena et al., 2011; Taylor & Fearne, 2009).

In the AFSC context, knowledge mobilization faces new potential boundaries. Compared with other industries such as automotive and electronic manufacturing, agriculture is possibly the least automated or standardized sector because of the wide

 DOI: 10.5709/ce.1897-9254.529

variety of work done at a much smaller scale. One consequence of this is the increasing difficulty of knowledge management (Chen et al., 2018; Boshkaska et al., 2018). Most knowledge is likely context specific, embedded in workers' daily practices, and significant effort is required to develop a particular area of knowledge. For example, first, at the farming stage of the supply chain, important knowledge that farmers require and apply includes topics such as soil management, seed sowing, pest control, fertilizer use, harvesting, and irrigation. However, at the food processing stage, the knowledge required and applied is very different from that in the farming stage. The knowledge important to food processors can be related to food materials, technology and machinery, production processes, prolonging the shelf-life of food, and quality control. Then, at the distribution stage, the important knowledge again differs from that in the farming or food processing stage. For distribution, workers must have knowledge about warehousing food products and produces, transport route scheduling, preventing product damage during transport, and batching for distribution. Finally, at the retailing stage, the required knowledge includes store layout, order handling, stock management, customer service, and customer needs. The knowledge required at these four different stages shows hardly any overlap, indicating that knowledge boundaries formclear barriers between the stages of the supply chain. However, many food-related issues, such as food quality, safety, and shelf-life, can only be adequately addressed if the knowledge boundaries can be crossed successfully along the entire supply chain (Massaro et al., 2016; Mau, 2008).

AFSCs have many boundaries mainly because several of the key factors identified (i.e., trust, time, and cost) have been proven to be likely to create barriers to knowledge mobilization activities. Thus, this study specifically considers the factors that affect knowledge boundaries in AFSCs. Although several studies have been conducted on critical factors in knowledge management (Jayawickrama et al., 2016), few have been performed on AFSCs, and CSFs are highly dependent on the sector. Therefore, identifying a list of factors that are acceptable for all sectors is impossible. Thus, this study also aims to identify CSFs in the AFSC context.

Moreover, several studies have addressed the classic issues of sharing information and knowledge in supply chains (Lubell, 2014), and many have developed theoretical and practical solutions with proven benefits from sharing information and knowledge. These studies provide valuable background knowledge for this study; however, academic literature that focuses on identifying the key factors in how AFSCs share knowledge and information to achieve knowledge mobilization remains scarce. This study aims to fill this gap in the literature.

To answer Research Question 1, 81 papers were selected for a systematic literature review and then classified based on the main factors. Table 1 reports the results for 11 key factors. The papers are listed in numerical order to highlight the main differences in addressing key factors when crossing boundaries within AFSCs. Each paper addressed one or more factors being addressed, with a maximum of five factors being addressed per paper for Papers 4, 6, 31, 42, 46 52, 53, and 76. A frequency analysis showed that the three most frequently addressed factors are collaboration, supply network structure, and power, followed closely by training/education, technology, trust, and commitment. The other four factors (i.e., time, cost, culture, and continuous improvement) have received less attention in the literature.

The systematic literature review also shows how the 11 identified factors have evolved over time. Initially, the key factors explored in the literature were mostly technology, training/education, and trust, followed by a growing interest in factors such as collaboration and supply network structure. More recently, the focus on some key factors such as culture, continuous improvement, and cost has diminished, while the interest in collaboration, supply network structure, technology, and trust has been maintained or substantially increased.

Among the 11 key factors, some can be considered enablers for knowledge mobilization, such as collaboration, training/education, and continuous improvement. Some are considered solely as barriers, such as time, cost, and culture. Other factors such as technology, supply network structure, time, and commitment can have dual roles. Specifically, if they are set and managed well, they can be enablers; however, they can also change into barriers without sufficient time and commitment or the appropriate technology

and supply network structure. Furthermore, some factors can affect each other. For example, a lack of training or education could switch technology from an enabler to a barrier. Similarly, collaboration can only be a true enabler if trust is established and commitment from partners is evident. The complexity of these key factors highlights the importance of investigating knowledge mobilization in AFSCs. These identified factors, including both barriers and enablers, are considered when developing the theoretical framework presented in the next section.

3. Theoretical Framework and Hypotheses

Historically, Sullivan and Nonaka (1986) theorize that knowledge is created when both tacit

Table 1

Key Factors Affecting Knowledge Boundaries as Highlighted in the Literature

Topic	Description	Papers
Power	1. Senior managers' involvement, interests, and lead the process (top-to- bottom implementation) 2. Government involvement (government policy support)	1, 4, 5, 6, 22, 24, 25, 29, 31, 42, 44, 45, 46, 52, 53, 56, 57, 68, 70, 71, 76, 80, 81
Supply Network Structure	1. Relationship between stakeholders (personal relationship, vertical or horizontal relationship) 2. Links between stakeholders in supply chain/community	1, 2, 3, 4, 5, 6, 7, 10, 11,12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81
Collaboration	1. Cooperation for a specific task or process 2. Information sharing and exchange between stakeholders	1, 2, 3, 4, 5, 6, 7, 8, 10,11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 40, 41, 42, 43, 44, 45, 46, 47, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67 ,68, 69, 70, 71, 72, 73, 74, 75, 76, 77 ,78, 79, 80 ,81
Technology	Utilize ICT to achieve specific functions or improve effectiveness and efficiency	2, 4, 6, 8, 9, 11, 13, 14, 16, 21, 25, 26,28, 29, 30, 31, 36, 38, 41, 49, 62, 65
Trust	1. Willingness to share knowledge and information 2. Willingness to accept suggestions, acquire knowledge, and act as request	4, 6, 10, 18, 19, 20, 24, 25, 26, 27, 30, 31, 33, 34, 35, 39, 40, 42, 46, 48, 49
Commitment	Agreement for a specific request or requirement (confidential information, purchasing agreement)	15, 20, 29, 40, 42, 46, 48, 50, 52, 53, 55, 78
Training/Education	The process of learning and understanding specific skills, technology, knowledge, and information.	7, 8, 9, 26, 27, 28, 37, 38, 41, 43, 46, 50, 52, 53, 56, 58, 63, 68, 71, 72, 73, 79, 80, 81
Time	Time for knowledge transfer, project span, technique, and approach implementation	4, 9, 21
Cost	Financial resources	9, 21, 43
Culture	Local or organizational culture	76
Continuous Improvement	Review process after implementation	76

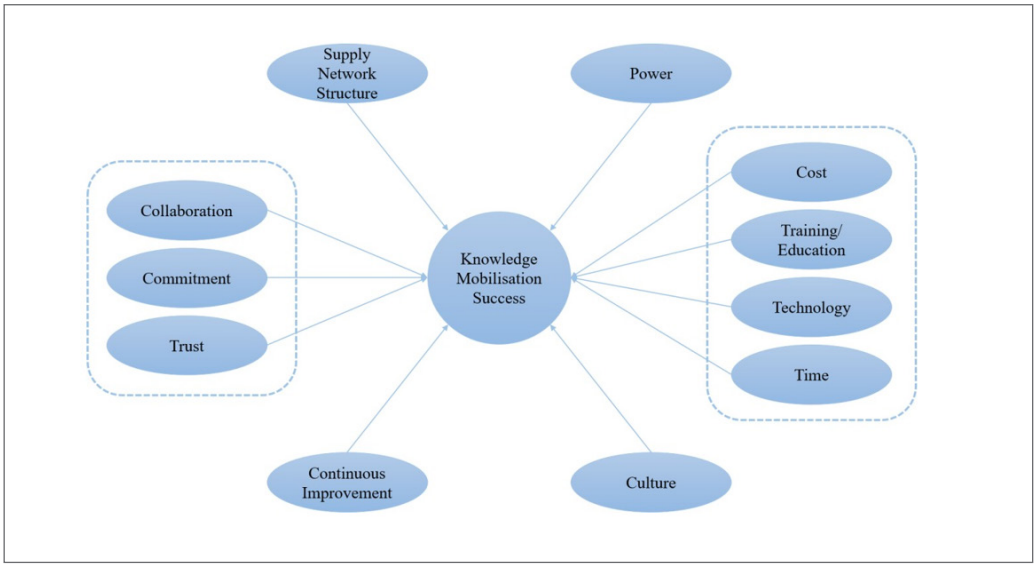
 DOI: 10.5709/ce.1897-9254.529

and explicit knowledge are complementing and interfacing with each other through four switching modes; namely, socialization, externalization, combination, and internalization (SECI). Exploring the SECI model, knowledge creation begins in tacit form; in the head of an individual and is converted to either tacit or explicit knowledge by means of socialization or externalization respectively. The SECI model depicts knowledge creation as a spiral, the knowledge lifecycle, also a common framework, depicts knowledge creation as a continuous cycle (Olan et al., 2019). Recent work associated with the knowledge lifecycle, although having varying explanations, they all share a few similarities in what they highlight as the stages which knowledge moves through in its lifecycle.

Given the positive effects of knowledge mobilization crossing boundaries, research has focused on tacit versus explicit knowledge (Cerchione & Esposito, 2016; Song et al., 2020). It is suggested that the basic cognitive process of knowledge mobilization between tacit and explicit knowledge is a natural process that is highly dependent on individual, organizational and the environmental factors (Maskey et al., 2020). Previously, individual intention had been assumed to be an attitude that not only was free from any consciousness but also did not regard the subject commitment to an object. It was later postulated that both the environmental information and the preoccupied frame of judgment are principal factors in the knowledge mobilization process, as it increases the individual intention and the degree of meaningfulness (Olan et al., 2019). In clustering factors affecting knowledge mobilization in AFSCs, supply chain characteristics such as relationship factors has been considered.

Through developing an understanding of the status of AFSCs, knowledge mobilization, and extant research findings, this study aims to determine

Figure 1
CSF Model for Knowledge Mobilization



the key factors affecting knowledge mobilization in AFSCs. Based on the literature review in Section 2, a theoretical framework is proposed to explore factors that could build or help remove knowledge boundaries within AFSCs. The framework is shown in Figure 1, which provides a preliminary list of CSFs. A list is then derived featuring three CSFs (collaboration, trust, and commitment) classified into one cluster: technology, training/education, time, and cost. In general, these categories help to answer Research Question 2. As this framework was developed from a literature review, it requires testing to determine based on empirical findings whether these factors truly represent the CSFs.

Establishing hypotheses based on the literature review is essential for validating the primary research findings. These hypotheses are categorized under specific themes to better align with the structure of the theoretical framework.

Power Dynamics and Supply Network Structure:

General Hypothesis: Power dynamics and supply network structure significantly affect knowledge mobilization in AFSCs.

Sub-Hypothesis 1: Balanced power distribution in AFSCs leads to more effective knowledge mobilization.

Sub-Hypothesis 2: The structure of the supply network plays a significant role in the success of knowledge mobilization.

Roles of Collaboration, Trust, and Commitment in AFSCs:

General Hypothesis: Effective collaboration, trust, and commitment positively influence knowledge mobilization success in AFSCs.

Sub-Hypothesis 3: A significant positive relationship exists between collaboration and knowledge mobilization success in AFSCs.

Sub-Hypothesis 4: Trust between supply chain partners significantly contributes to successful knowledge mobilization in AFSCs.

Sub-Hypothesis 5: Commitment among AFSC stakeholders significantly enhances knowledge mobilization success.

Influence of Technology and Training/Education on Time and Cost Management in AFSCs:

General Hypothesis: The adoption of appropriate technology and training/education positively affects efficient cost and time management in knowledge mobilization success in AFSCs.

Sub-Hypothesis 6: Advanced technology adoption is significantly related to improved cost and time management in knowledge mobilization in AFSCs.

Sub-Hypothesis 7: Adequate training and education of supply chain professionals significantly contribute to cost and time management in the success of knowledge mobilization.

Sub-Hypothesis 8: Efficient time management in supply chain operations significantly impacts knowledge mobilization.

Sub-Hypothesis 9: Cost management strategies influence the success of knowledge mobilization in AFSCs.

Additional Factors Influencing Knowledge Mobilization:

General Hypothesis: Other factors such as culture and continuous improvement are crucial in determining the success of knowledge mobilization in AFSCs.

Sub-Hypothesis 10: A culture supportive of knowledge sharing enhances knowledge mobilization across the supply chain.

Sub-Hypothesis 11: Continuous improvement processes positively affect knowledge mobilization in AFSCs.

3.1. Influence of Power Dynamics in AFSCs

Dobson et al. (1998) have suggested that retailers in the sector benefit from greater power in supplier relationships and that increased average gross and net margins suggest that retailers are increasingly able to retain the benefits of their increased bargaining power rather than passing them on to consumers. Thus, equal power distribution has a positive impact on long-term relationship maintenance. Given the unequal distribution of market power within AFSCs, relationship sustainability may be enhanced by organizing farmers into groups to engender perceptions of enhanced market power and facilitate communication (Patton et al., 2023). According to our

hypothesis on power dynamics, the distribution of power within AFSCs is expected to greatly influence the success of knowledge mobilization.

Uneven power distribution in AFSCs makes it difficult to mobilize expertise since strong businesses are frequently reluctant to impart information to smaller ones. However, actions made to empower farmers and producers, such as creating co-operatives, can balance the distribution of power in the supply chain and promote the exchange of information in both directions. This will encourage the development of dependent connections among all participants in the supply chain. Every party in the network will voluntarily share knowledge if no single company has total control.

3.2. Understanding Supply Network Structures in AFSCs

The general management literature offers a well-established research stream underscoring how knowledge flows across networks (Inkpen & Tsang, 2016). Network-level studies can encompass vertical, horizontal, and diagonal links to capture the complexity of supply networks. Understanding network-level processes is crucial. Moreover, solutions to tackle sustainability may call for the engagement of multiple stakeholders not only at the local level but also throughout supply chains (Benali & Burlat, 2012; Pathak et al., 2014).

Knowledge mobilization is significantly affected by supply network layout and structure. Knowledge dispersion between partners is facilitated by dense networks with numerous interconnected links (Scholten & Schilder, 2015). However, disconnects caused by flawed network architecture prevent unconnected enterprises from exchanging knowledge (Walker et al., 2013). Encouraging targeted partnerships to bridge these gaps promotes openness and information exchange. When supply network links go beyond simple transactional ties to include NGOs, government organizations, and other pertinent stakeholders, knowledge mobilization is further enabled (Touboulic et al., 2014). By adding significant organizations that offer supervision and support, networks increase the ability for group learning and innovation uptake.

Therefore, the hypothesis suggests that knowledge mobilization will be greatly affected by optimizing AFSC network topology. An integrated structure that fosters information sharing is created by strategically filling in structural gaps and strengthening ties between key supply chain participants.

3.3. Implementation of Collaboration, Trust, and Commitment in AFSCs

Previous studies have found that increasing collaboration is important for improving supply chain performance in terms of satisfying customers and increasing efficiency (Kumar, 2014; Marques, 2019; Wolfert et al., 2010). Intense collaboration can also solve sustainability trade-offs, as no single firm can master all areas of expertise (Scholten & Schilder, 2015).

However, collaboration cannot exist in supply chain relationships without meaningful trust and commitment. Trust is a vital issue in buyer–supplier relationships, as it influences both knowledge sharing and collaborative planning, and it especially plays a moderating role in the collaboration- related decisions of small firms (Brunetto & Farr-Wharton, 2007; Cai et al., 2010). Overall, trust is the degree to which partners perceive each other as credible and benevolent and is expected to have a positive effect on the degree of collaboration in supply-chain relationships. Commitment is characterized by long-term relationships or the willingness of each partner to exert effort on behalf of the relationship. Trust and commitment are dimensions of a business relationship that determine the degree to which each party feels they can rely on the integrity of the other (Jie & Gengatharen, 2019). The assumptions reflect the importance we believe that the three factors of collaboration, trust, and commitment have in determining the composition and efficiency of supply networks in AFSCs. According to the hypothesis, efficient information exchange along agri-food chains is made possible by teamwork based on trust and commitment.

3.4. Technology and Training/Education: Key Drivers in AFSC Time and Cost Efficiency

Technology has generally been considered a key enabler for knowledge mobilization in supply chain management. In the current digital era, technologies such as the Internet of Things and Big Data

analytics have fundamentally revolutionized how knowledge is mobilized (Serazetdinova, 2019). To use advanced technologies in AFSCs as enablers for knowledge mobilization, appropriate levels of training/education are usually required, even for business and supply chain professionals. Training/education will provide or accelerate the relevant workforce's skills, knowledge, and competence in handling technology (Kebebe, 2019). Well-trained/educated business and supply chain professionals can fully utilize emerging technologies to improve supply chain performance, such as through cost reduction and time-saving. However, the inability to use technology correctly could have the opposite effect or even disastrous results for supply chains (Amentae, 2018). The integration of advanced technologies and adequate training in AFSCs is hypothesized to significantly enhance knowledge mobilization, as indicated in the related hypotheses.

3.5. Cultural Effects on Knowledge Mobilization in AFSCs

In the AFSC context, the research on how culture affects knowledge mobilization remains insufficient. One possible reason for this could be that some supply chain partners may lack the desire or motivation to share knowledge beyond their own organizations' boundaries (Lyu & Zhang, 2017). As suggested by our theory on cultural influences, the culture inside AFSCs is considered a critical component in determining the success of knowledge mobilization. However, how a culture can be created that fosters knowledge mobilization across different stages of a supply chain remains under-researched. If such a culture can be created and maintained across an entire supply chain, it could be converted from a barrier to an enabler for knowledge mobilization and peer learning.

The beliefs, customs, and attitudes that influence perceptions of information sharing are all part of an organization's culture (Cao & Zhang, 2010). Furthermore, the propensity to cooperate and share information is directly affected by culture. Our hypothesis shows that knowledge mobilization across dispersed AFSC networks is facilitated by a culture of openness, transparency, and mutual gain. This collaborative culture can be fostered by encouraging supply chain partners to embrace a common vision and identity. Thus, targeted interventions and incentives could be required to overcome deeply rooted norms that prevent external information exchange.

3.6. Continuous Improvement and Its Role in AFSCs

Continuous improvement has been widely used as an approach to business operations management, such as when the well-known plan–do–check–act (PDCA) cycle is successfully implemented (Slack & Brandon-Jones, 2019). Consistent with our continuous improvement hypothesis, we posit that continuous improvement is essential for improving knowledge mobilization in AFSCs. The partners involved in AFSCs are diverse and share complex relationships; thus, the cycles or iterations in knowledge mobilization among them are not entirely straightforward processes.

The hypothesis posits that implementing periodic reviews and progress tracking facilitates gradual improvements in information exchange strategies over time. However, barriers to ongoing improvement exist in dispersed, multi-partner AFSC networks. Centralized coordination is necessary to orchestrate stakeholder participation to reflect, assess, and enhance collaborative processes. Networkwide designated knowledge brokers who can facilitate continuous cycles of evaluation and improvement may be necessary.

4. Research Methodology

In this study, questionnaires were distributed to obtain opinions from a large group of respondents: AFSC experts and workers with key roles in knowledge mobilization crossing boundaries. In general, questionnaire surveys are suitable to use because they can reach many respondents more easily than other methods. In total 500 surveys were sent, among which 364 were returned and deemed usable, providing 364 evaluations of knowledge activities in various organizations. We used quantitative analysis techniques to explore and examine the relationships and trends in the data (Saunders et al., 2019). The data were exported into SPSS, which is a statistical analysis software program. In SPSS, data

 DOI: 10.5709/ce.1897-9254.529

are presented in a table format that can be used for data analysis.

For data analysis, first, descriptive statistics was used to check for normal distribution of the collected scores. This is important, as many statistical techniques (i.e., multiple regression analysis) assume that the data are normally distributed. A non-significant result with a p-value greater than 0.05 is required for normal distribution (Easterby-Smith et al., 2012). Second, multiple linear regression analysis was used to test the relationships among the CSFs and knowledge mobilization success. This technique allowed for a deeper exploration of how the identified CFSs influence knowledge mobilization outcomes.

The primary data collection used purposive and snowball sampling methods, enabling a diverse and representative sample of respondents. First, data collection started from an EU Horizon 2020 project, Risk and Uncertain Conditions for Agriculture Production Systems (RUC-APS), which involves 16 partner organizations. The researchers' affiliation with one of these partners facilitated the collection of data from this consortium. Then, to expand the sample size, a questionnaire was sent to contacts recommended by RUC-APS partners to scale up the sample size via snowballing effects and create a network of participants. The questionnaire was also sent to professional groups such as those associated with knowledge management. LinkedIn's professional network was utilized to establish contact and distribute the questionnaire. Moreover, databases such as FAME were leveraged to send approximately 300 emails to organizations, introducing the study's purpose and providing a link to the electronic questionnaire.

To maximize sample size and minimize missing responses, primary data were collected using both paper-based and electronic surveys. Paper surveys were distributed among 16 organizations that are partners with RUC-APS. The electronic survey was designed through Qualtrics and distributed via three channels.

- Professional groups: A list of 16 organizations, as partners on the consortium of an EU Horizon 2020 project, RUC-APS, were approached because a researcher is affiliated with a partner on this project and has access to other partner organizations. We also reached out to professional groups such as those working in knowledge management via the LinkedIn professional network. A dialogue opens with a link to an online questionnaire as well.
- Websites: Call participants (https://www.callforparticipants.com): made a research on this website profile, and participants were asked to fill out the electronic questionnaire. The purpose of the site is to accelerate studies conducted by college or university students, allowing them to recruit participants from their own networks.
- Email questionnaire: The FAME database was used to identify approximately 180 organizations. The organizations were sent approximately 300 emails containing information on the study and its purpose along with a link to the electronic questionnaire.

5. Data Analysis and Findings

As this study aims to identify the critical factors that influence knowledge mobilization success, multiple linear regression analysis is appropriate to conduct because it determines the relationship between one dependent variable (success criterion) and several independent variables (CSFs) and the ability of the CSFs to predict knowledge mobilization success. Specifically, four regression analyses are necessary, as knowledge mobilization success is defined through four success criteria (input efficiency, output efficiency, effectiveness, and adaptability). Each criterion is tested separately against the CSFs.

The Kolmogorov–Smirnov and the Shapiro–Wilk tests are used to test the normality of the data. Normality is provided if the significance factor (Sig.) is above 0.05, representing a non-significant result (Pallant, 2020). In this study, the data collected for all the factors are normally distributed. A correlation analysis is then performed to assess the relationships between individual CSFs and the success criteria. This analysis reveals significant correlations, with some key findings. Specifically, collaboration, supply network structure, trust, commitment, training/education, and technology exhibit positive correlations with various success criteria. The significance of cooperative efforts in boosting knowledge mobilization within AFSCs is highlighted by the favorable correlations identified be-

tween parameters such as collaboration and other success metrics. This is consistent with previous studies showing that, in complicated supply chain systems, cooperation is not only advantageous but also necessary.

Furthermore, power and culture are negatively correlated with knowledge mobilization success, indicating that they have adverse effects on success in this context. These findings imply that specific hierarchical structures and cultural elements may hinder knowledge mobilization within AFSCs. This shows that a more nuanced understanding of these elements in the context of AFSCs is necessary, as the findings contradict the general assumptions in previous research. Regression analysis provides a more thorough understanding of the quantitative effects of each CSF on knowledge mobilization, bolstering the idea that elements such as technology and collaboration are important contributors to the success of AFSCs rather than merely facilitators. This quantitative evaluation complements and extends the theoretical viewpoints addressed in earlier research, providing a deeper understanding of the dynamics in AFSCs.

Table 2 shows an example using the correlation between "training/education" and "effectiveness."

As Table 2 shows, the p-value is 0.019. The rule of thumb used here is that $P < 0.05$ indicates statistical significance and $P < 0.001$ indicates a high level of statistical significance. Thus, 0.019, this correlation is considered statistically significant. Based on the results, the correlation coefficient is assessed to find the strength and direction of the relationship. Training/education and effectiveness are positively and significantly correlated, and together, these two variables account for 16.56% of the total variance ((0.407)2 * 100 = 16.56%).

Table 3 shows the results of all statistically significant correlations. The strongest correlations are between collaboration and input efficiency, collaboration and output efficiency, supply network structure and effectiveness, and technology and adaptability. Furthermore, all correlations except those including power and culture are positive, supporting the argument that both power and culture have negative effects on knowledge mobilization success.

As Table 4 shows, 8 of the 11 CSFs are statistically significantly correlated with the success criteria; two of them (i.e., power and culture) have negative correlations and six have positive correlations. Among the CSFs, collaboration has the most correlations among the success criteria.

However, cost, time, and continuous improvement show no significant correlations to any of the success criteria.

The actual regression analysis is conducted next. The multiple linear regression model can be expressed as follows:

Table 2

Correlation Test (Collaboration and Input Efficiency)

			Did the knowledge mobilization remain effective?	Training/ Education
Spearman's rho	Did the knowledge mobilization remain effective?	Correlation Coefficient	1.000	.407*
		Sig. (2-tailed)	.	.019
		N	364	364
	Training/ Education	Correlation Coefficient	.407*	1.000
		Sig.(2-tailed)	.019	.
		N	364	364

*. Correlation is significant at the 0.05 level (2-tailed).

 DOI: 10.5709/ce.1897-9254.529

Success Criteria = β0 + β1 × Collaboration + β2 × Supply Network Structure + β3 × Trust + β4 × Commitment + β5 × Training/Education + β6 × Technology + β7 × Power + β8 × Culture + ε

A breakdown of the components is as follows:

- Success Criteria: This represents the dependent variable, which encapsulates "input efficiency," "output efficiency," "effectiveness," and "adaptability." These factors measure the overall success or performance criteria in the context of knowledge mobilization within AFSCs.

- β0: The intercept term, which signifies the expected level of success when all independent variables are zero.

- β1 to β8: The regression coefficients associated with each independent variable (CSF). They quantify how a one-unit change in each CSF affects the success criteria while holding all other factors constant.

- ε: The error term accounts for unexplained

Table 3

Summary of the Statistically Significant Correlations

Variable 1	Variable 2	Significance level	Correlation Coefficient	Shared Variance
Collaboration	Input efficiency	0.007	0.551	30.36%
Supply network structure	Input efficiency	0.013	0.486	23.62%
Culture	Input efficiency	0.040	-0.417	17.35%
Collaboration	Output efficiency	0.006	0.528	27.81%
Trust	Output efficiency	0.024	0.468	21.90%
Power	Output efficiency	0.045	-0.396	15.68%
Commitment	Output efficiency	0.028	0.439	19.27%
Training/Education	Effectiveness	0.019	0.407	16.56%
Collaboration	Effectiveness	0.023	0.445	19.80%
Supply network structure	Effectiveness	0.003	0.559	31.25%
Collaboration	Adaptability	0.015	0.481	23.14%
Training/Education	Adaptability	0.012	0.487	23.72%
Technology	Adaptability	0.004	0.543	29.48%

Table 4

Overall Results of the Correlations

CSFs	Input efficiency	Output efficiency	Effectiveness	Adaptability
Collaboration	+	+	+	+
Supply network structure	+		+	
Time				
Power		–		
Technology				+
Cost				
Trust		+		
Training/Education			+	+
Culture	–			
Continuous improvement				
Commitment		+		

variations in the success criteria, reflecting the discrepancies between the model's predictions and actual observed values.

The primary objective of this model is to ascertain how the combined influence of the CSFs in the context of knowledge mobilization within the AFSCs. By estimating the regression coefficients β1 to β8, the model helps quantify the specific effect of each CSF on the overall success criteria. The analysis can reveal which CSFs play a significant role in determining the success or effectiveness of knowledge mobilization efforts in this specific domain. The model also considers the potential influence of the error term (ε) on the success criteria, accounting for any unexplained variance in the data.

Table 5 provides an overview of the findings in Section 3, linking back to the hypotheses and offering insight into the relationship between CSFs and success criteria. Collaboration had the strongest correlation with the success criteria, indicating its critical role in achieving success in knowledge mobilization. This finding is supported by the systematic literature review in Section 2, which identified collaboration as among the most frequently mentioned key factors.

As noted above, collaboration has the strongest correlation with the success criteria as each is linked to the four success criteria. Eleven key factors were identified in the systematic literature review in Section 2. According to the frequency at which the factors appear in the literature they are, in descending order, collaboration, supply network structure, power, technology, trust, training and education, commitment, time, cost, and continuous improvement (Amentae, 2018; Kebebe, 2018). Compared to the previous literature, it can be seen that not all CSFs are correlated to the success criteria. Some are correlated to several success criteria whereas others are only related to one or two.

The systematic literature review also analyzed how these factors change over time to identify the trends. Over the time period, collaboration and supply network structure have remained the two most important factors. The importance of power has decreased over time. The factors of training and education have increased overall. Technology has also shown an overall increase or maintained its high level of importance. However, three factors have disappeared over time: continuous improvement, time, and cost. Subsequently, in the empirical study, only the eight remaining factors are investigated.

Table 5
Hypothesis Testing Results

	Input efficiency	Output efficiency	Effectiveness	Adaptability
1. Power	H1a	**H1b**	H1c	H1d
2. Supply network Structure	**H2a**	H2b	**H2c**	H2d
3. Collaboration	**H3a**	**H3b**	**H3c**	**H3d**
4. Trust	H4a	**H4b**	H4c	H4d
5. Commitment	H5a	**H5b**	H5c	H5d
6. Technology	H6a	H6b	H6c	**H6d**
7. Training/Education	H7a	H7b	**H7c**	**H7d**
8. Time	H8a	H8b	H8c	H8d
9. Cost	H9a	H9b	H9c	H9d
10.Culture	**H10a**	H10b	H10c	H10d
11.Continuous improvement	H11a	H11b	H11c	H11d

 DOI: 10.5709/ce.1897-9254.529

The empirical findings generally support those from the systematic literature review, indicating good consistency between the theoretical and empirical study. Accordingly, it is fairly confident to believe that properly addressing the eight key factors is crucial to the success of knowledge mobilization in AFSCs. The congruence between the empirical findings and the systematic literature review highlights the evolving nature of AFSCs, as factors such as collaboration and supply network structure are gaining prominence. This evolution reflects the changing dynamics in AFSCs, indicating the need for adaptive strategies that address these key factors effectively.

6. Conclusions

This study's findings can significantly increase the current understanding of knowledge mobilization across AFSCs. A thorough analysis shows and defines the roles of critical components such as technology, supply network structure, and collaboration that have a substantial impact on the success of information mobilization in these complex networks. This study contributes to the current body of literature currently available on this subject by providing a comprehensive analysis of how these numerous components interact to enhance the efficacy and efficiency of AFSCs.

This study examines the crucial role that collaboration plays. The results emphasize that cooperation is an essential factor for effective knowledge mobilization within AFSCs, rather than only a supporting element. Furthermore, this study offers new perspectives on how technology is changing these supply chains. This study also provides valuable insights into supply chain process improvement by explaining how technological advancements and their adoption affect knowledge sharing and application. Furthermore, a thorough understanding of the complexities found in these systems can be acquired by analyzing the supply network architecture. These findings help explain how the architecture of these networks can either help or hinder the effective application and exchange of knowledge, which directly affects the operational viability of AFSCs.

6.1. Answering the Research Questions

This study's three research questions can be fully answered by combining the theoretical and empirical findings. Key factors affecting knowledge mobilization are demonstrated in the theoretical framework. Eleven key factors were identified based on a systematic analysis of 81 papers presented in Section 2: collaboration, supply network structure, power, technology, trust, commitment, training/education, time, cost, culture, and continuous improvement. The quantitative analysis results reported in Section 4 validate most of these key factors based on data from a questionnaire survey. However, three of the factors (i.e., continuous improvement, time, and cost) disappeared, resulting in eight remaining key factors. Thus, Research Question 1 has been answered in both the systematic literature review and quantitative analysis in this study.

Research Question 2 is also answered through the systematic literature review in which the key factors, including barriers and enablers, were classified. Barriers can create boundaries for knowledge mobilization, whereas enablers will help knowledge to mobilize across those boundaries. Sometimes, some factors cannot exist in the supply chain relationship without other factors present. Thus, all of these factors are intermingled.

Research Question 3 focuses on the correlations between the CSFs and knowledge mobilization. During the quantitative phase of this study, over 300 survey questionnaires were collected and analyzed using multiple linear regression. Eight of the 11 CSFs show correlations with the success criteria.

6.2. Contributions to the Existing Literature

The study adds to the current body of literature on AFSCs. By presenting empirical data, this study sheds light on the often overlooked but crucial roles that dedication and trust play in promoting productive information exchange and teamwork within AFSCs. By examining these subtle elements in-depth and demonstrating their substantial influence on the operational dynamics of AFSCs, this study transcends the conventional focal areas. Understanding the nuances of stakeholder interactions and how they affect the overall effectiveness of these supply chains requires insight into these issues.

Furthermore, this study expands the current knowledge by quantitatively evaluating the influence of several CSFs on AFSCs. A more accurate and objective understanding of how each component affects the overall efficacy and efficiency of supply chains is made possible using this quantitative method. The results provide new insights into the complex relationships and interdependencies that exist within AFSCs while also challenging and improving the theories that are already in use.

The study also emphasizes how critical it is to incorporate these less- studied variables into the operational and strategic planning processes for AFSCs. In doing so, it offers helpful recommendations for industry professionals who seek to maximize supply chain efficiency. This study adds to the current body of literature and can be used as a guide to enhance supply chain procedures in the agri-food industry.

6.3. Recommendations and Implications of the Study

This study makes several contributions to business management practices. Exploring the practical application of knowledge mobilization in AFSCs is of practical significance. AFSCs involves multiple links such as food production, processing, transportation, distribution, and sales, and their operation is related to global food supplies and food security. Studying its factors directly affects the achievement of the United Nations' goals to reduce hunger. Regarding knowledge management, this study provides a better understanding of key factors affecting knowledge mobilization, including both barriers that create knowledge boundaries and enablers that help remove those boundaries. Among the 11 key factors included in the theoretical framework, eight were further supported in the empirical findings. The evolution from the theoretical to empirical phase demonstrates how key factors have changed over time and been perceived by literature and practitioners. In addition, identifying the factors that have the most driving power or are least dependable could be very useful for business managers in making appropriate decisions when selecting the factors on which they should focus if not all factors can be included simultaneously. Thus, the following implications can be drawn from this study.

Governments and international organizations can work to improve the sustainability and efficiency of relevant links to ensure food safety. This includes developing regulations, policies, and standards; providing planting and transportation subsidies; and implementing other measures to promote the sustainable development of domestic agriculture. Furthermore, agricultural product supply chain managers can use the relevant research results to improve efficiency. This includes optimizing inventory management, reducing transportation costs, and improving supply chain traceability and transparency to reduce food waste and loss, while also helping to prevent food contamination and food-related disease outbreaks.

The first step for a management team should be building internal knowledge repositories where definitions, meanings, and experiences can be shared to solve problems such as integrated pest control and crop management. Routinely performing group activities such as training to enhance employees' knowledge and their abilities to share and transfer knowledge among them is also important. Then, to lobby the government for increased support, management teams should advise their organizations to join associations such as groups for farmers or processors. Moreover, organizations in AFSCs should build and maintain their knowledge mobilization teams. Previous experience shows that knowledge privacy has stopped senior personnel from delivering their knowledge down to the next standard. Furthermore, some organizations do not have time to waste on learning because learning results in lost work as well as therefore invalid. When teams listen, they can identify similar attitudes in some senior leaders and middle directors. Overall, knowledge mobilization teams can provide knowledge on how to improve operations and provide the circumstances for cooperation and learning.

6.4. Limitations

Although both the theoretical and empirical findings of this study are promising and valuable, several limitations should be recognized that could provide avenues for future research. First, this study identified 11 key factors potentially affecting knowledge mobilization success in the theoretical section and validated eight of them in an empirical analysis. However, further plans to rank the factors using more scientific methods such as

AHP (Analytic hierarchy process) and evaluation using field visits could be implemented. Second, while the study's heavy emphasis on quantitative data is advantageous for statistical analysis, it might not fully reflect the range of organizational and social dynamics that affect knowledge mobilization in AFSCs. Quantitative techniques may fail to consider the intricate interpersonal and cultural aspects commonly involved in such relationships. Third, this study was conducted strictly within the AFSC context. The empirical data were only collected from crop-based agricultural food chains; thus, caution is needed in applying the findings to other types of food chains, such as those for dairy and meat products. The generalization of the findings to a wider supply chain context needs further testing. Furthermore, the proposed research model and study hypotheses were based on previous literature and the perceived quality of knowledge mobilization in the supply chain procedures. Therefore, the research model needs further validation.

6.5. Directions for Future Research

Future studies in this field are crucial given the abovementioned limitations. The goal of future research should be to apply this study's findings to wider food supply chain contexts. This would improve the results' relevance and applicability to a range of AFSC settings, supporting or contradicting the findings' generalizability. A deeper, more comprehensive understanding of the underlying social and organizational elements influencing knowledge mobilization in AFSCs may also be possible through integrating qualitative research methods. A more thorough investigation of the attitudes, motives, and actions of those involved in these supply chains would be possible with qualitative methodologies. Furthermore, an interesting line of inquiry would be to examine how new technologies such as blockchain fit into the framework of knowledge mobilization within AFSCs, particularly in developing nations. These technologies have the power to completely transform the efficiency and transparency of supply chains, and a careful examination of how they affect knowledge mobilization in these situations is necessary.

Acknowledgment

The work reported in this paper has benefited from the RUC-APS project funded by the European Commission under the Horizon 2020 Programme (H2020-MSCA-RISE Award No. 691249).

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