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Agricultural Supply Chain Risk Management: A Systematic Literature Review and Research Agenda

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Abstract: *The abstract should not contain any undefined abbreviations or unspecified references. This article is intended to conduct a Systematic Literature Review (SLR) on agricultural supply chain risk management (ASCRM) from 2012 to 2022, discuss the state-of-the-art, identify the theory and methodology used in this area, and develop an integrated model for managing agricultural supply chain risks that will be a more comprehensive modeling technique throughout the entire process of agricultural supply chains. The process of ASCRM and its taxonomies have garnered considerable attention in the literature related to ASCRM. The research emphasizes the significance of utilizing theory and methodology in the area, but it shows that only a limited number of theories are used in the field, and the research methods used are too limited and outdated. Seven future directions are identified. An integrated model was proposed.*

Keywords: Agricultural supply chain, Risk management, Current status, Research gaps, Systematic literature review

1. Introduction

Agricultural supply chains are the intricate mechanism of moving agricultural goods from one market to another (Leng et al., 2018). Risks in agricultural supply chains might originate from the internal or external environment. Agricultural supply chain risks are linked to unavoidable changes in the functioning of the agricultural supply chain and adversely affect supply chain performance. A growing amount of attention is being paid to agricultural supply chain risk management (ASCRM) in both industry and academia to manage and lessen the adverse consequences of such risks.

Few academics have completed literature reviews and compiled significant study results in the previous decade. Choirun et al. (2020) evaluated the elements influencing the sustainable growth of agri-food supply chain risk management by reviewing 30 journal publications published between 2010 and 2019. Behzadi et al. (2018) reviewed 42 journal papers published between 1993 and 2015 and produced the first comprehensive literature assessment of risk

management models for agricultural supply chains. Septiani and Astuti (2017) established a framework model to control risks in the agri-food supply chain after analysing 45 journal publications published between 2005 and 2017. Septiani et al. (2016) analysed 77 journal publications published between 2004 and 2014 that employed methodology and technique mapping to agri-food supply chain management.

Even though the review mentioned above papers significantly advance ASCRM, we decided to conduct this research since there are two crucial knowledge gaps. First, as shown in Table 1, each of these review papers focuses on a particular aspect of ASCRM, such as risk factors (Choirun et al., 2020). Second, the COVID-19 pandemic poses unprecedented risks to agricultural supply chains since 2019. None of these reviews is fresh enough to include the vast majority of research published after 2020.

Table 1: An overview of topics addressed in prior ASCRM review articles

Title	Author	Methodology
Sustainability risk management in the agri-food supply chain: literature review	(Choirun et al., 2020)	SLR
Agribusiness supply chain risk management: A review of quantitative decision models	(Behzadi et al., 2018)	No discernible methods
Identifying research advancements in supply chain risk management for Agri-food Industries: Literature review	(Septiani and Astuti, 2017)	A literature survey
Method and approach mapping for agri-food supply chain risk management: A literature review	(Septiani et al., 2016)	No discernible methods

To address these shortcomings, this article thoroughly reviews all relevant ASCRM-related academic journals published between 2012 and 2022. Moreover, we also developed an integrated agricultural supply chain risk management model, an enhanced modelling technique for the entire agricultural supply chain process.

2. Methodology

This paper employs a systematic literature review methodology to conduct a comprehensive examination of relevant documentation. As outlined by Boland et al. (2017), a systematic literature review is a rigorous approach aimed at uncovering, assessing, and integrating the most valuable available information pertinent to a specific research question, with the objective of providing meaningful and fact-based responses. This method involves scrutinizing prior research conducted on a particular subject. The search encompassed "all fields," extending beyond titles and keywords, and employed search phrases such as "agricultural/agri-food/agribusiness" and/or "supply chain risk." Prominent academic databases, namely Web of Science, IEEExplore, ScienceDirect, and Taylor and Francis, were utilized for locating relevant journal articles. Moreover, Google Scholar was incorporated into the literature search to augment its comprehensiveness. By selecting these esteemed databases, the potential biases stemming from publication preferences and reviewer inclinations were minimized. This study excluded lectureships, master's and doctoral theses, textbooks, book chapters, and notes, as they did not meet the criteria of peer-reviewed journal articles published in English. To ensure currency of the findings, the search was further constrained to publications released between 2012 and 2022, resulting in 370 initial findings. After eliminating duplicates, the total number of articles reduced to 317 in the initial phase. Subsequently, the retrieved articles were

examined based on the citations and impact factor of each published paper, thereby ensuring the inclusion of high-quality publications. Ultimately, 20 articles satisfied the inclusion criteria of the ASCRM.

3.Results of ASCRM literature review

3.1 Descriptive features of ASCRM literature (grouping 1)

Due to the restriction on examining the publishing trend for ASCRM using the 20 articles that were chosen, it only gives a general overview of the 317 publications that were ultimately retrieved and published in the previous ten years.

3.1.1 Time distribution of publication of articles

Figure 1 depicts the field's growth rate, with the number of articles growing since 2012, except for 2016. Since 2017, the number of articles has increased significantly. The Year 2021 made an immense contribution to the papers published.

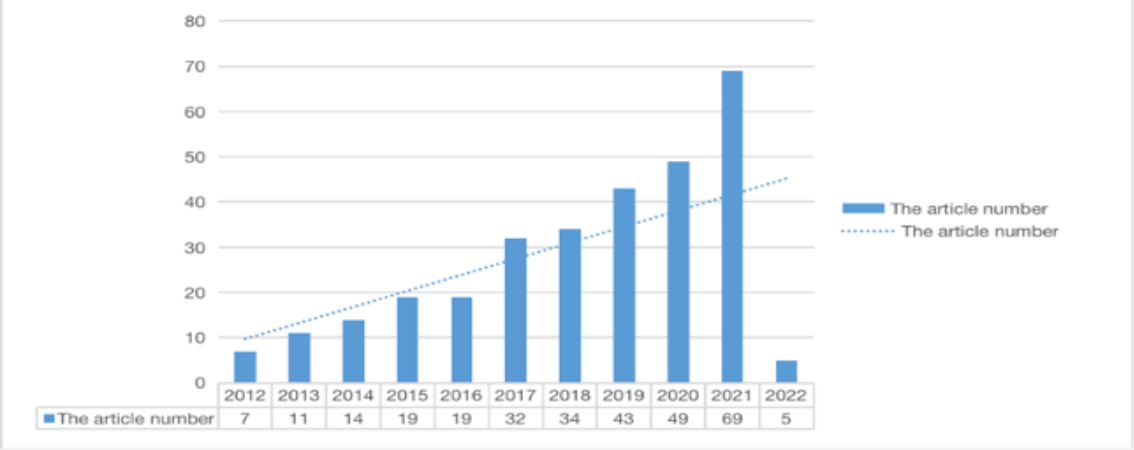

Figure 1: The article numbers

3.1.2 Journal titles

According to the ranking of the total number of citations of articles published by journals, we have sorted the influence of journals. The ten influential journals are listed in Table 2.

Table 2: Top 10 Journals

Journal titles	No. of papers	Total number of citations
JOURNAL OF OPERATIONAL RESEARCH	4	12
INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	4	11
SCIENCE ENVIRONMENTAL RESEARCH LETTERS	1	9
OMEGA-INTERNATIONAL JOURNAL OF MANAGEMENT SCIENCE	7	8
GLOBAL ENVIRONMENTAL CHANGE-HUMAN AND POLICY DIMENSIONS	3	7
FOOD CONTROL	5	6
OPERATIONAL RESEARCH	2	5
AGRICULTURAL SYSTEMS	5	4
APPLIED MATHEMATICAL MODELLING	1	4

3.1.3 Contributing country

According to a descriptive study of the nations that contributed to ASCRM, as shown in Table 3, academic researchers from China made up the majority of the journal's articles (23.44% of the total), followed by those from the United States and the United Kingdom (21.136% and 14.511% respectively). In addition, researchers in China, The United States, the United Kingdom and other countries had a strong cooperative relationship.

3.2 Definitional Concerns (grouping 2)

3.2.1 Definition of ASCRM

In the literature, the ASCRM concepts have been found to lack consensus and a comprehensive understanding. This lack of shared understanding and clear description poses challenges for academics in their interaction with practitioners and in conducting empirical research in the field. To address this issue, Burgess et al. (2006) recommended providing a complete definition rather than making assumptions. ASCRM definitions have been categorized into original, revised, and existing definitions.

By examining the existing literature, Fan and Stevenson (2018) offer an updated and comprehensive overview of supply chain risk management (SCRM). SCRM is the process of identifying, analyzing, mitigating, and monitoring risks present in a supply chain through a thorough review of previous research in the field. This process involves the internal application of tools, methods, and strategies, as well as external coordination and collaboration with supply chain members. Both internal and external factors contribute to the success of this endeavor. The goal of SCRM is to reduce the susceptibility of the supply chain to disruptions, enhance its continuity and profitability, and thereby gain a competitive advantage. This explanation encompasses the entire SCRM approach, from its inception to its ultimate objective.

In the context of this article, the term "agricultural supply chain risk management" refers to the process of identifying, assessing, treating, and monitoring risks within the agricultural supply chain. This is accomplished by employing internal tools, techniques, and strategies, as well as external coordination and collaboration with supply chain members. The overall aim is to decrease vulnerability, ensure continuity, maintain profitability, and establish a competitive advantage.

3.2.2 Taxonomy for ASCRM literature

As was already said, there is no consensus on what agricultural supply chain risk management entails, and the bulk of studies only focus on one section or component of the supply chain. Supply chain performance, risk identification, risk assessment, and the utilization of new technology are the four main topics of these articles.

a) Risk identification

Risk identification is the first phase of the ASCM process and a fundamental aspect of risk management. The significance of risk identification is defined by the organization's need to recognize its hazards (Tchankova, 2002). In addition, risk identification necessitates the determination of all risk causes (or drivers), existing risk reducers (preventive and proactive), and the risk's effect (Aqlan & Lam, 2015). Consequently, risk identification must adopt a thorough strategy to identify all possible supply chain risks and weaknesses (Kern et al., 2012).

According to the many factors that contribute to the development of risks in an agricultural supply chain, risk drivers, including those connected to weather/natural catastrophes and biological and environmental factors, are foremost among them. Other risks include those

connected to the market, logistics, infrastructure, politics, policy, and institutions, as well as those relating to finances and operational management (Sabila et al., 2022; Yeboah et al., 2014).

In addition, pandemic disruptions caused by COVID-19 have posed significant difficulties for ASC. The epidemic had a negative impact on agricultural SC in terms of the risks associated with harsh humanitarian circumstances and unpredictable commercial conditions, which had an effect on the socioeconomic environment all over the globe. Food waste, an increase in the price of ASC, a change in consumer habits, a disruption in supply and demand, a lack of storage space, a loss of income for producers, and societal distress as a result of untimely harvesting, acquiring, and market availability are some of the adverse effects that COVID-19 has had on ASC. As a consequence, the risks associated with COVID-19 need to be considered by ASCRM.

b) Risk assessment

The second element of SCRM is risk assessment. It involves assigning probabilities to risk-bearing occurrences inside the system and assessing the consequences of these risk occurrences stated in the initial phase (Tuncel & Alpan, 2010).

Both qualitative and quantitative scientific data are required for risk assessment (Faustman & Omenn, 2008). In order to lay the groundwork for supply chain risk mitigation and other management decisions, supply chain risk assessment encompasses all activities that are used to qualitatively or quantitatively evaluate, analyze, calculate, quantify, test, and individual template indicators, summary scores, or the overall level of identified risks in supply chains (Tran et al., 2018). It has been suggested to develop the supply chain risk assessment using a hybrid method (Nakandala et al., 2017; Tarei et al., 2018). In light of this, the term "agricultural supply chain risk assessment" refers to the process of employing qualitative, quantitative, or mixed methods in order to evaluate, analyze, quantify, and rank the risk factors that are present in agricultural supply chains in order to assist in risk management. Sabila et al. (2022) and Jiang et al. (2019) both utilize a method called the fuzzy analytic hierarchy process (Fuzzy AHP) to evaluate the risk of ASCs. In addition, Bayesian Network (BN) and structural equation modelling (SEM) is also used in this area.

c) Supply chain performance

The phrase "supply chain performance" describes the activities the whole supply chain performs to meet end-customer needs, such as guaranteeing that items are supplied and delivered on time and that there is sufficient inventory and capacity to do so. Since it uses raw materials, components, subassemblies, and finished commodities along with a variety of distribution methods, supply chain performance crosses organizational boundaries (Hausman, 2004). According to Waqas et al. (2022), risks have an adverse impact on supply chain performance, and supply chain risk management mitigates this relationship. By working horizontally among producers and vertically with processors and retailers, the supply chain becomes less susceptible to risks and performs better as a result (Leat & Revoredo-Giha, 2013).

d) The application of new technology

Numerous scholars in the literature have also stressed how, with the use of empirical investigations, the deployment of new technologies might reduce the hazards brought on by SC interruptions (Ivanov & Dolgui, 2021). Some researchers have also proposed using digital technologies like AI and IoT to reduce SC risk brought on by unforeseen events and interruptions like COVID-19 (Nayal et al.; Yan et al., 2017)). The use of AI and IoT in Agri-

SCRM is still in its infant stages. Studying the use of new technologies in the field of ASCRM is a new area of research.

3.3 Theoretical concerns (grouping 3)

Any discipline's proper development depends on the advancement of its theories (Wacker, 1998). This part will discuss how theory is used in agricultural SCRM. This section determined whether one or several theories were used for the subset of papers that used the theory and what theories were used. Some academics favor building theories on top of existing ones (Pfeffer, 1995), while others promote creating new and original ideas (Van Maanen, 1995). There seems to have been very little progress in the creation of theories for the subject of agricultural SCRM. We decided to build on existing ideas where applicable since Amundson (1998) offered a sufficiently comprehensive list. The currently prevalent theories may concentrate on economics (transaction costs and others, including agency) and strategic management (resource-based view, contingency theory, knowledge management theory).

Table 3 highlights the trend in theory utilization and shows how the variety of theories employed has gradually increased. Most articles (45%) lacked any currently identifiable hypotheses. None of the remaining publications advanced a novel agricultural SCRM theory; they all just repurposed previous notions. Most research used theory derived from other disciplines, with strategic management accounting for 30% of all theory frames. Only one study tried multi-theory grounding, and only 20% of papers included economic theories.

Table 3: Categorized articles by theory

Theory	Articles	Count
No discernible theories	(Sabila et al., 2022)(Rath et al., 2022)(Geng et al.)(Yang and Xie, 2019)(Evelyn and EdmondYeboah, 2015; Lam et al., 2015; Leat and Revoredo-Giha, 2013; Wang and Hao, 2016; Xuefeng et al., 2019)	9
Economics	(Ray, 2021)(Jiang et al., 2019; Yazdani et al., 2019)(Yan et al., 2018; Yazdani et al., 2019; Yeboah et al., 2014)	4
Strategic management	(Nayal et al.)(Muchfirodin et al., 2015; Yan et al., 2017; Yi and Li, 2013; Zhang, 2014)(Yan et al., 2018)	6
Multiple theories	(Waqas et al., 2022)	1
Total		20

3.4 Research methods (grouping 4)

Research methods include the tactics, processes, and techniques used to obtain data or evidence for analysis to either uncover new information or acquire a more in-depth understanding of a topic. There are several sorts of research methodologies, and those utilized in agricultural SCRM were roughly categorized as qualitative, quantitative, and mixed approaches (Ghadge et al., 2012). Research methodologies such as empirical investigation, conceptual theory, and literature review were used to categorize qualitative research methods further. Likewise, quantitative research approaches were categorized as mathematical modelling, statistics, and probabilistic theory and simulation. Hybrid approaches are a mixture of the two preceding techniques. Table 4 displays the results of categorizing the articles according to the employed research methodologies. Table 4 demonstrates that 12 out of the 20 papers, or 60%, were categorized as employing quantitative approaches. The quantitative approaches are somewhat more common (6 out of 20 or 30%) than the qualitative methods. Only two papers used mixed techniques in the previous literature studies for the agricultural SCRM.

Table 4: Categorized articles by research methods

Methods	Articles	Count
Qualitative Methods	(Yan et al., 2018)(Muchfirodin et al., 2015)(Lam et al., 2015)(Yeboah et al., 2014)(Zhang, 2014)(Leat and Revoredo-Giha, 2013)	6
Quantitative Methods	(Waqas et al., 2022)(Sabila et al., 2022)(Geng et al.)(Rath et al., 2022)(Nayal et al.)(Yang and Xie, 2019)(Jiang et al., 2019)(Xuefeng et al., 2019)(Wang and Hao, 2016)(Wang and Hao, 2016)(Evelyn and EdmondYeboah, 2015)(Yi and Li, 2013)	12
Mixed Methods	(Yazdani et al., 2019) (Yan et al., 2017)	2
Total		20

4. Discussion

4.1 Description features of ASCRM literature (grouping 1)

Before 2016, there were not many articles about ASCRM, only a dozen. From 2017, there was a rapid growth stage, and by 2021, there were 69 articles. This shows that the field is still relatively new, given the growth in articles over a decade. In terms of publications, the ASCRM publishes papers in a broad variety of journals, indicating its interest in scholars from diverse backgrounds. China and the United States agriculture businesses are expanding rapidly compared to the contributing nations. This is claimed since China and the United States are both significant agricultural nations.

4.2 Definitional Issues (grouping 2)

This section mainly focuses on "the identification, assessment, treatment, and monitoring of agricultural supply chain risks". It was discovered that research has often concentrated on a single stage or a small subset of the four ASCRM phases, as shown in Table 5. While this makes sense, it indicates that a comprehensive approach to understanding the whole ASCRM process is lacking.

Table 5: Classification of the ASCRM process

Articles	Risk identification	Risk assessment	Risk treatment	Risk monitoring
(Waqas et al., 2022)		×		
(Sabila et al., 2022)	×	×		
(Geng et al.)			×	
(Rath et al., 2022)	×	×		
(Nayal et al.)		×		
(Ray, 2021)		×		
(Yazdani et al., 2019)			×	
(Yang and Xie, 2019)		×		
(Jiang et al., 2019)	×	×		
(Xuefeng et al., 2019)		×		
(Yan et al., 2018)		×		
(Yan et al., 2017)		×	×	
(Wang and Hao, 2016)	×	×		
(Muchfirodin et al., 2015)		×	×	

(Evelyn and EdmondYeboah, 2015)	×	×		
(Lam et al., 2015)		×		
(Yeboah et al., 2014)	×	×		
(Zhang, 2014)		×	×	
(Leat and Revoredo-Giha, 2013)		×	×	
(Yi and Li, 2013)			×	

Regarding risk identification of agricultural supply chains, most scholars do not fully explain the risks in this field or only analyze the risks in a specific agricultural supply chain. Jaffee et al., 2010 and Yeboah et al., 2014 comprehensively summarized the main risks existing in the agricultural supply chain. It points out that the main Risks of the agricultural supply chain include weather and natural disasters risks, biological and environmental Risks, market-related risks and logistical risks and infrastructural risks, financial related risks, managerial and operational Risks, policy and institutional risks, political related risk. After 2019, however, the COVID-19 pandemic presents tremendous threats to agricultural supply chains. Only a few scholars have focused on the risks posed by COVID-19 to agricultural supply chains. For example, Sharma et al. noted the labor market impact of restrictions on the movement of migrant workers due to lockdowns brought about by COVID-19. In addition to labor market problems, logistics and transportation have also been struck. Nayal et al. noted that market closures, labor shortages and the closure of national or international borders lead to wastage of agricultural products, increased supply chain costs and disruption of supply and demand.

In agricultural supply chain assessment, mathematical and operational research models are primarily used to assess and rank known risks, such as: ordered weighted averaging（OWA） operator(Yan et al., 2017; Yan et al., 2018), analytic hierarchy process（AHP） (Evelyn & EdmondYeboah, 2015; Muchfirodin et al., 2015) (Yan et al., 2018), game theory (Yi & Li, 2013), technique for order preference by similarity to an ideal solution (TOPSIS) (Wang & Hao, 2016). Through reading the articles in the field of non-agricultural supply chain risk assessment, we found that in addition to the above models, many other models can be used to assess supply chain risk.

Among the above articles, only five discussed risk mitigation strategies for the agricultural supply chain risk mitigation. (Waqas et al., 2022) identified knowledge management as an important joint SCRM practice in improving supply chain performance. Yan et al. (2017) explored the application of the Internet of Things, and artificial intelligence, in agricultural supply chain risk mitigation and proved a positive correlation between them. Leat and Revoredo-Giha (2013) proposed supply chain collaboration is used as a risk mitigation strategy. Yi and Li (2013) found that compensatory weather contracts could reduce the risks.
Risk monitoring, the final stage of the ASCRM process, has gotten little attention so far, although it is a vital aspect of the entire ASCRM strategy.

4.3 Theoretical concerns (grouping 3)

Table 3 demonstrates that the researchers did not put out any novel theories for the agricultural SCRM body of knowledge. As a result, the majority of academics thought that agricultural SCRM could be explained by expanding upon already established concepts. Burgess et al. (2006) argued that despite the fact that numerous theories are now in use in the field, no one extant theory could explain all that is adopted under SCM. However, they are insufficient to

fully explain agricultural SCRM, and the field requires further theory development. The current theories have a current focus on economics (transaction costs and others, including agency) and strategic management (resource-based firm and competitive advantage perspectives).

4.4 Research methods (grouping 4)

It is clear that approximately equal numbers of papers use quantitative and qualitative methodologies. Case studies dominate qualitative research among them, and one of the main reasons is that more and more practitioners are looking for academic partnership chances to determine the best means of gaining a competitive advantage in the agriculture sector. In terms of quantitative research methods, it can be concluded that there are still lots of new models in the field of supply chain risk management in addition to those already used in agricultural SCRM by comparing highly cited articles in the field of non-Agri-SCRs published in recent years (as shown in Table 6).

Table 6: Previous Studies on Non-agricultural supply chain risk

Author(s)/Year	Research Context	Theory	Methodology
(Moktadir et al., 2021)	Leather Industry	Best Worst Method	Survey
(Kumar et al., 2021)	Food Industry	Fuzzy-best worst methodology	Survey
(Pakdeenarong and Hengsadeekul, 2020)	Organic rice	Best Worst method	Survey
(Vishnubhotla et al.,2020)	Oil Company	Heat map	Survey and Interview
(Abdel-Basset and Mohamed, 2020)	Telecommunications Company	TOPSIS- CRITIC	Mixed-method
(Junaid et al., 2020)	Automotive Industry	AHP and TOPSIS	Case study

5. Development of an integrated model

The aforementioned paragraphs make it very evident that there is no integrated model. This study extracts a structure from the supply chain risk management processes to create an integrated risk management model consisting of the four basic SCRM phases. First, pertinent risks are carefully characterized by literature research and a questionnaire survey, and a preliminary assessment is conducted. Next, using the AHP (Analytic Hierarchy Process) or BWM, quantify the priority weight of the identified hazards (Best Worst Method). Third, the interrelationships between the hazards are then investigated using Interpretive Structural Modeling (ISM). Finally, empirical investigations are carried out to extract currently applied risk reduction techniques for further analysis. The priority ratings of the determined methods for mitigating SC-related risks are then captured using Fuzzy TOPSIS.

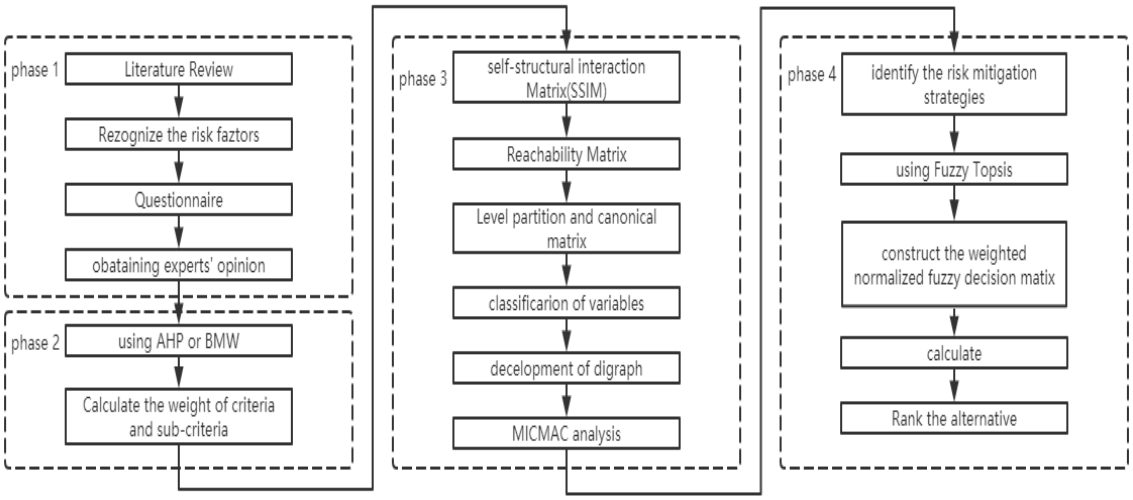

Figure 2: Development of an integrated model for ASCRM

6. Literature gaps identified

In terms of research, it is crucial to comprehend the state of the field today and identify any gaps in the literature using the body of information already in existence. Despite the fact that the studies examined in this chapter have offered some insightful information on hazards and risk management in the agricultural supply chain, it is clear from them that there is still much space for improvement in this area of study, and the research is relatively dispersed.

According to the available studies, the majority of the study has concentrated on a few particular risk management steps, including risk identification or risk assessment. The research on the whole ASCRM procedure is absent (Gap 1).

In the first stage of SCRM, known as risk identification, risks throughout the agricultural supply chain are identified along with their underlying causes. Even though there are some studies addressing agriculture supply chain risk factors, systematic identification receives little attention; moreover, the risks associated with COVID-19 were only mentioned by a few (Gap 2).

Only a few papers introduce theory to the comprehension of ASCRM. To better comprehend ASCRM, the theory has to be applied more widely and, in more depth (Gap 3).

It is not acceptable to utilize a single approach as a method of risk management since various models would assist decrease each model's downsides, and numerous newer models might be tried to update the usage of models in this area (Gap 4). In addition, the bulk of the present agricultural SCRM research on risk assessment merely examined risk factors and offered taxonomies of those hazards that were found without considering the interactions between each risk. Because understanding the interaction between risks allows for evaluating the effect of risks' sequential and parallel pathways in order to assist decision-making on the relative importance of each risk path and its primary underlying causes(Kwak et al., 2018) (Gap 5).

Although some articles put forward risk mitigation strategies, for decision-makers, selecting the most appropriate mitigation strategies is critical, and one of the ways to test the effectiveness of risk mitigation strategies is to see their impact on supply chain performance. Thus, further research is needed to verify and analyze risk mitigation strategies' impact on agricultural supply chain management performance (Gap 6).

The agricultural supply chain is always dynamic and is affected by many uncertain factors, which poses a significant challenge to risk monitoring. Therefore, risk monitoring is a relatively blank field (Gap 7).

7. Conclusion

Through a thorough and organized literature assessment, this article sheds light on the conceptualization and research methodological foundations of the agricultural SCRM area. This article contributes to research in the following aspects. First, it provides a systematic review of existing literature in this field. We screened out 20 articles and put forward the research status of ASCRM through the classification and analysis of the 20 articles to help researchers better understand the trend changes in this field. The study found that at present, most researchers only focus on a part or a specific aspect of the supply chain. The research in this field mainly focuses on four aspects: risk identification, risk assessment, supply chain performance, and application of new technologies. Second, we also found seven research gaps in this field through systematic analysis. The research mainly shows that the process of ASCM research is missing, the risk identification is not comprehensive enough, the relevant theories are not in-depth enough, the research method is too single, and the risk mitigation strategies are not effectively verified. We encourage researchers to fill these research gaps and take them as the direction of future research. Third, based on previous research, this research puts forward an integrated model for ASCRM that phases the four basic SCRM. The suggested comprehensive model may assist researchers in more thoroughly assessing the current risks of the agricultural supply chain, exploring the potential relationships between the various risks, and linking risk mitigation strategies to supply chain performance.

This research also contributes to practice; managers of ASCs would benefit from this review. First, the various issues may serve as guidelines for managers considering risk management in this field from the complete process. Second, the proposed model is helpful for decision-makers to evaluate risk factors more thoroughly and provide optimal risk mitigation strategies.

This study has two main limitations, and one is that it is possible that some papers were missed. Another is that the comprehensive model proposed in this paper has not been validated.

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