Determinants of supply chain risk management and performance in agro-industrial firms

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Abstract

Effective supply chain risk management is crucial for the success of agro-industrial firms, as it enables them to navigate the complex and dynamic challenges inherent in the agricultural sector. This study examines the determinants of supply chain risk management and performance in agro-industrial firms in Africa using partial least square structural equation modeling to analyze data from a sample of 367 supply chain managers. The findings show that operational risk management does not have a positive impact on the performance of supply chain, but strategic risk management does. Customer relationship also has a positive impact on the performance of supply chain. Also, the results indicate that supply chain risk management constructs (operational risk management and strategic risk management) positively affects customer relationship. The results suggest that agro-industrial firms in Africa should focus on developing strategic risk management capabilities in order to improve their performance and customer relationships. In addition operational risk management and strategic risk management are also important for agro-industrial firms in Africa, as they may face more strategic risks, such as political instability and economic shocks. The findings have important implications for managers, policymakers, practitioners, and researchers. From a managerial perspective, managers must form alliances with logistics service providers to divest themselves of services like transportation where they lack essential competencies. The study's conclusions may also be helpful to other service sectors, organizations and managers in emerging nations to take into account potential risks and mitigate them with managerial strategies and assist in lowering the risk occur within the organization. Also, the findings

suggest that researchers should conduct further research on the role of strategic risk management in agro-industrial firms in Africa, particularly in the context of new and emerging risks. The findings offer practical guidance for managers seeking to enhance their firm's supply chain risk management capabilities.

Keywords: Agro-Industrial Firms. supply chain performance. supply chain risk management.

1. Introduction

Supply chain risk management (SCRM) is a critical process for businesses of all sizes, but it is especially important for agro-industrial firms in Africa. These firms operate in a complex and uncertain environment, characterized by political instability, economic shocks, and natural disasters. In addition, agro-industrial firms typically have long and complex supply chains, which can make it difficult to identify and manage risks. Supply chain (SC) is a field that involves many intricate partnerships and coordination amongst several stakeholders (carriers, distributors, retailers, suppliers, and producers) in order to enhance the movement of information, goods, and funds across the SC (Abbasi & Varga, 2022). Gunasekaran, Patel, and Tirtiroğlu (2001) describe the SC as a framework whose essential parts contain material supplier, the manufacture equipment, the delivery service and the customers who are connected via the anticipated and return flows of materials. The ability of the company to recognize and the process of controlling social, environmental, and economic risks within the SC are called SCRM.

In Africa, multifaceted risks surround these actions, making SC more or less vulnerable. They face a full of complex barriers due to their delicate character and consideration for the efficient execution of processes. Despite the challenges, SCRM is essential for agro-industrial firms in Africa to achieve sustainable performance. Companies and managers are developing strategies to allow them to take measures of these risks, mitigate them, or transfer them (Birkie, Trucco, and Campos, 2017). SCRM helps firms to identify, assess, and mitigate risks to their supply chains. This can help to reduce costs, improve efficiency, and ensure the delivery of high-quality products to customers. This is achievable by implementing agile and resilient SCs as well as contingent planning (Carter & Rogers, 2008).

Furthermore, SCRM can be understood as the internal manager-to-manager collaboration within the organization to guarantee improved partner coordination or relationship with other companies and improved asset performance. Performance is defined as

the potential that results from carrying out subsequent actions to meet the goals and aims. Coordination and cooperation with chain partners who could be intermediary or raw material suppliers, middlemen, clients and third-party logistics service providers are also the part of it (Aunyawong et al., 2020).

Managers in an organization coordinate thousands of activities, and every organization has a SC relationship with other companies by default. Certain internal operations of two entities will be coordinated and handled by the two legally independent components once a connection is made between them. As a result, a link that qualifies as a SC network is a relationship between two businesses. For instance, a manufacturer's internal operations are connected. They may have an impact on a distributor's internal operations, which are connected to and may have an impact on a retailer's internal operations and management tasks. The management tasks required for supply, conversion, logistics, and research is known as supply chain management (SCM). SCM combines management of supply and demand inside and between firms (Ju, Christopher, and Baker, 2007). However, managers at low authority managing power in organizations have less willing by involving staff members in goal-setting because they think staff members' participation in decision-making could lead to issues for the company (Pervaiz et al., 2021).

Several studies have addressed the issue of risk management (RM) in businesses, examining the idea from various angles. Accordingly, the total of the risks associated with the supply activities (upstream) and the distribution activities (downstream), which address risk in terms of market complexity, would be the SC's overall risk (Sharma & Modgil, 2013). From Dai, Bai, and Anderson (2020) perspective, risk encompasses several factors such as limited supply, rapid technological advancements and material substitution, obstacles to market entry, advanced logistical costs or intricacies, and market monopolies. Naik and Suresh (2018), mentioned in there study, since they lack the finances and market and information access necessary to implement technical improvements, poor farmers in developing nations are likely to be left out of trade. To achieve international trade norms and business needs, firms in emerging nations must take new institutional and organizational measures. Treating SC risks is also seen as a means of creating value and a means of differentiating oneself from the competition; most importantly, it keeps performance negatively impacted (Manuj, Esper, and Stank, 2014).

For instance, for some, the achievement of certain performance levels is dependent on the internal organization of the structure (Vainieri et al., 2019), which states that the organization's procedures, choices, and actions are what lead to exceptional customer

performance. Managers must focus on internal critical operations, which make it possible to maintain a high level of customer relations, but also take an interest in any event that may affect them. To improve their competitiveness, many companies and managers have incorporated SCM for increasing productivity and accomplish particular company objectives including enhancing the value of the customer, using resources effectively, and improving productivity (Aunyawong et al., 2020).

Researchers from SC have looked at performance from a number of perspectives (Purwanto and Juliana, 2022; Dinesh et al., 2014; Gunasekaran, Patel and Tirtiroğlu, 2001). Because of the many aim conflicts that are commonly seen inside firms, scholars continue to face difficulties in defining and measuring performance (Gençer, 2019). Despite the importance of SCRM, there is limited research on the determinants of SCRM and performance in agro-industrial firms in Africa. This paper aims to address this gap in the literature by examining the following research questions:

What are the key determinants of SCRM adoption and implementation in agro-industrial firms in Africa?

How does SCRM affect the performance of agro-industrial firms in Africa?

To fill the gap, this study looks into the relevance of SCRM and the performance paradigm in developing country or emergent economy. Additionally, the study's conclusions also contribute to filling a knowledge vacuum in academia on the importance of creating a sustainable SCRM to improve the SC performance of Agro-Industrial firms as a whole as well as the performance of individual companies. Therefore, this research addresses SCM on the aspect of investigation into risk reduction practices and identifies the impact of SCRM and customer relationship on performance of SC. This paper contributes to the literature in several ways. First, it provides a comprehensive and up-to-date review of the literature on SCRM in agro-industrial firms in Africa. Second, it develops a conceptual model that integrates the key determinants of SCRM and performance in agro-industrial firms in Africa. Third, it empirically tests the conceptual model using data from a sample of agro-industrial firms in Africa.

In Addition, the study's conclusions provide managers looking to improve SCP and strengthen their company's SCRM skills with useful advice:

a) *Strengthen ORM Practices:* Prioritize investments in quality control measures, process automation, and employee training to minimize operational disruptions and ensure product quality consistency.

b) *Adopt SRM Strategies:* Diversify supply sources, establish risk-sharing agreements with suppliers, and engage in regular communication and collaboration to mitigate strategic risks and enhance supply chain resilience.

c) *Cultivate Strong Customer Relationships:* Foster open communication channels with customers, actively gather feedback, and demonstrate responsiveness to their needs to build trust and collaboration, leading to improved demand forecasting and supply chain alignment.

By implementing these recommendations, agro-industrial firms can effectively manage supply chain risks, enhance customer satisfaction, and ultimately achieve superior SCP, positioning themselves for long-term sustainability and growth.

2. Literature Review And Hypothesis Development

Many researchers have studied SCM and its performance in various companies. For instance, Vainieri et al. (2019) mentioned, taking advantage of the supplier's capabilities and taking a long-term perspective of the SC in customer relations are correlated to the company's performance. Brito, Brito and Hashiba (2014) argue that the cooperative customer-supplier relationship positively impacts companies' financial performance. Also, Arcuri and Giolli (2022) demonstrate that strategic integration (upstream) leads to increased company performance. A growing body of research suggests that SCRM has a positive impact on the performance of agro-industrial firms. For example, a study by Rwakira (2023) found that SCRM has a positive impact on the performance of agro-food processing firms in Uganda. Another study by Mutekwe, Mafini and Chinomona (2020) found that SCRM has a positive impact on the performance of manufacturing firms in Zimbabwe.

According to Memia, Ngugia and Odhiambo (2018), there is a substantial link between customer relationships and the success of developing countries manufacturing companies. The results align with those of Akroush *et al.* (2011) who discovered a robust link among customer relationship management and the business success, including financial and marketing performance metrics. Creating agri-industrial organizations that can adapt to changing market demands, preserve product quality and safety, and accelerate product delivery through transportation routes by effective logistics management are the main challenges of developing agro-supply chains in developing nations (Naik & Suresh, 2018).

However, none of this research has focused on the downstream relationship (producer-distributor). They also did not examine a possible mediation of customer relationship

orientation between RM and chain performance what this research intends to do. Despite the growing body of research on SCRM in agro-industrial firms, there are a number of gaps in the literature. First, most of the research on SCRM has been conducted in developed countries. There is a need for more research on SCRM in agro-industrial firms in Africa. Second, most of the research on SCRM has focused on the impact of SCRM on financial performance. There is a need for more research on the impact of SCRM on other aspects of performance, such as operational performance and customer satisfaction.

2.1.Determinants of operational RM on the performance of the SC

Multiple factors influence performance in SC. Therefore, the risk occurrence requires managers to establish and develop particular actions to address the potential repercussions. The company's operations in the short, medium, and long terms may be impacted by these repercussions. Therefore, chains that are resilient to risk occurrence would be considered successful (Shekhar et al., 2019). Risks may improve a company's performance as well as the performance of the SC as a whole by providing visibility from end to end, addressing issues that erroneous information, and developing complementing strategies to manage risks (Christopher and Lee 2004; Wong, Boon-Itt and Wong 2011; Riley, Janis and Sridharan 2016). According to Mutekwe, Mafini, and Chinomona (2020) study, SCRM usually increases both the firm's operational performance and SC overall in the Zimbabwean food retail industry. Furthermore, Meye *et al.* (2019) state that SC risks are always growing and changing in South Africa, which may significantly impact SC and performance of the organization. Considering the literature mentioned above and viewpoints, we postulate the first hypothesis as follows:

H1: *Operational RM positively impacts the SC performance of the firm*

2.2. Determinants of operational RM on customer relationship

Operational RM is a process of identifying, assessing, and mitigating the risks associated with the day-to-day operations of a business. Customer relationship management is a process of managing the interactions between a business and its customers. Operational risk is a constant concern for businesses in all sectors. This risk relates to economic activity and covers commercial dealings between customers and suppliers (Grondys et al., 2021). In light of this study, development of customer relationships is more positively impacted by

operational RM in developing countries which also impacting the SC performance. Operational risk can be identified by several factors, including the firm's reliance on a limited number of suppliers, the way corporate resources are employed, and the frequency of consumer complaints over the quality of the products (Dvorsky et al., 2021).

There is a growing body of research that suggests that operational RM has a positive impact on customer relationship in African firms. For example, a study by Saruchera (2016) found that operational RM has a positive impact on customer satisfaction and loyalty in African firms, particularly in Zimbabwe. RM adoption is critical when taking into account potential disruptions to operational activities, such as on-time delivery, international rivalry, and strict customer standards (Naude & Chiweshe, 2017). According to (Farhan et al., 2018) a significant risk factor for implementing customer relationship management is insufficient support from the top management. The authors suggest the following second theory in light of this:

H2: *Operational risk management positively influences the customer relationship*

2.3. Determinants of customer relationship on the performance of the SC in a firms

According to Boulding *et al.* (2005), many companies have embraced customer relationship management during the past decade. Managing customer relationship is the primary method or philosophy used to control how the business interacts with its clients. Customer relationship management is "a comprehensive strategy that allows a business to find, acquire, maintain, and develop customers that are profitable by developing and upholding long-term relationships with them (Badwan et al., 2017)." The development of customer relationship management models indicates the significance of customer satisfaction in corporate activities (Narayanan SP, Rath H, Mahapatra S, 2017). Strong customer relationships can yield insights that can be leveraged to improve operational effectiveness and save costs (Gil-Gomez et al., 2020). It gets harder for other businesses to step in after they have this degree of close relationship with their clientele.

According to Marie Antoinette, David, and Christian (2012) study, performance in Cameroon's microfinance institutions is positively impacting the closeness (proximity) of the interpersonal relationships and the computerized management of the customer connection. However, less attention has been paid to the connection between customer relationship management and organizational success. Many suggestions have indicated that customer relationship management and sustainable SCM tend to work for companies more frequently in

developing countries to achieve organizational performance (Das & Hassan, 2021). According to Mohammad, Rashid and Tahir (2013) findings, knowledge management, customer relationship management through technological means, customer orientation, and relationship management for customers both positively and significantly influenced various performance perspectives (Bagherzadeh et al., 2020); Vinicius and Pessôa, 2022). Based on the above literature, it is necessary to conduct research to check and analyze how customer relationship management affects a firm's performance. Therefore the third hypothesis is stated accordingly:

H3: *The customer relationship positively impacts the performance of the SC in a firm*

2.4. Determinants of strategic RM on the performance of the SC of the firms

The findings of Meye *et al. (*2019) suggest that SC strategic RM are constantly growing and changing in the third-party logistics sector in South Africa, and these risks may significantly impact organizational and SC performance. Typically, risk is concentrated on how performance management will affect the business. Although, some empirical research has identified Africa as a region with the highest risk of poor performance for sourcing activities Wan Zahari Wan Yusoff and Maziah Ismail (2008), managers' perceptions of location-related characteristics may be skewed by regional stereotypes due to a lack of first-hand experience with subpar performance. As global competition intensifies and supply chains get increasingly intricate, there is a greater chance of not achieving the targeted SC performance, mostly because of the risks of SC breakdowns (Tummala & Schoenherr, 2011). Any event that negatively impacts SC processes and performance indicators, including service levels, responsiveness, and cost is considered a source of SC risk. To increase SC performance, SC managers need to make decisions and think strategically. The SCRM process ensures this. In light of this, the study puts up the following theories:

H4: *Strategic RM impacts the performance of the downstream SC*

2.5. Determinants of strategic RM on customer relationship

The majority of businesses are changing the way of managing strategic risk as well as giving it higher emphasis. Embracing or avoiding risks in daily operations and business operations; determining product prices based on risk; maintaining client connections; and putting tactical risk mitigation measures and backup plans into place in case of unexpected

events are just a few examples of critical business and RM decisions. Manufacturers, distributors, and retailers in Africa now face a significantly higher level of strategic sourcing risk than they did three years ago, and this risk is only anticipated to increase as supply chains become more globally connected (Jonathan et al., 2019). In Africa, systems for managing customer relationships might be considered a type of enterprise (Papadopoulos et al., 2012). Based on this, the management of customer relationships management risk may refer to RM strategies that are strategic in environment and used to risk mitigation that impedes a successful operation of firm-wide customer relationships management projects (Mendoza et al., 2007). This is similar to how enterprise-wide risks are managed.

H5: *Strategic risks management in the SC influences the company's customer relationship*

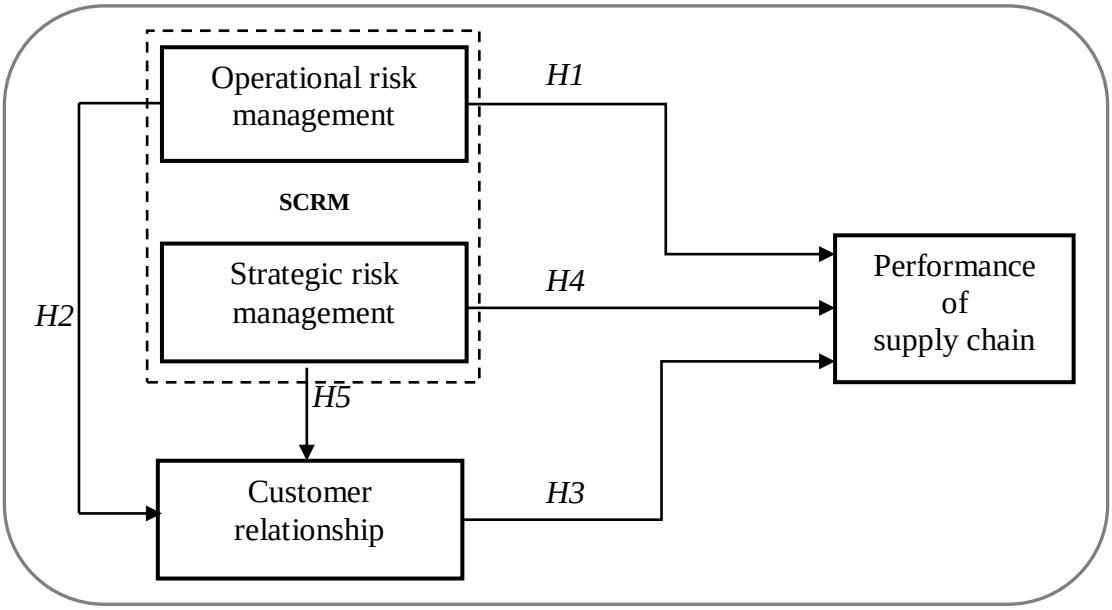

Figure 1: Conceptual framework

Figure 1 shows the theoretical framework which is drown based on the literature mentioned above and developed hypotheses. It shows that Clarifying SCRM and employing this strategic process as a competitive advantage is essential for organizations to operate successfully globally.

3. Methodology

The apprehension of the problem developed here requires the consideration of many parameters. The research connects latent concepts whose manifestation is perceptible by many indicators more or less tested in the SC literature. Indeed, this research has four (04) constructs: operational risks management, strategic risks, customer relationship, and

performance of SC. The researchers selected customer relationships as a mediator because it affects SC performance. This research is based on structural equation models with latent variables to understand the associations underlying these hypotheses.

The study employed a quantitative method. Online survey was used to get the data. The process for choosing responders was a straightforward random sample. Everyone in the population is equally likely to be selected using straightforward random sampling procedures (Acharya et al., 2013). Developing countries' agro-industrial companies make up the study's population. The sample size was computed online with a minimum sample size of 380 and a 95% confidence level and 5% margin of error. To resolve the issue of non-response and minimize inaccuracy in sample size, ten present of the questionnaire distribution was added to the minimal sample size of 418, which was the result of the computation. As a result, 418 surveys were given to the respondents. We have received 367 valid responses in total. The questionnaires were modified from earlier studies by (Dellana, Rowe and Liao, 2021; Das and Hassan, 2021; Li, Juan and Li, 2021; Lee and Severance, 2007).

3.1. Data Analysis and Results

The data from the online survey were analyzed using the Partial Least Structural Equation Modeling (PLS-SEM) approach. To find particular single factor signals from actor analysis, the varimax rotation technique was used in a principal component analysis to all measurement scale objects. The Harman one-factor test is used in this study to determine whether common method bias (CMB) exists between the variables (Malhotra et al., 2004). With a test score of 34.3%, the model only adequately explained around 50% of the variance. The results show that our model does not have any problems with CMB (Podsakoff et al., 2003).

3.2. Reliability and Factor Analysis

According to Table 1, the average variance extracted (AVE) value of the model meets the suggested cut-off value of a value for all theories Chin (1998), and both constructions have composite reliability (CR) values are ≥ 0.700 (Sarstedt et al., 2019). Table 1 presents the combined findings for the validity and reliability of each construct.

Table 1: Composite reliability and validity

Constructs	Cronbach's Alpha (α)	CR	AVE
Operational risk management	0.881	0.903	0.511
Performance of supply chain	0.916	0.933	0.669
Customer relationship	0.864	0.894	0.515
Strategic risk management	0.917	0.931	0.631

By analyzing the composite reliability data, the internal consistency technique was used to test the reliability. The comparability of the data was assessed using the Fornell-Larcker test, and AVE test was used to assess the discriminant and convergent validity (See Table 2). To satisfy the criteria for discriminant validity, Every latent variable's square root of AVE needs to be greater than the correlation between the latent variables (Hulland, 1999).

Table 2: Fornell-Larcker (criterion)

	1	2	3	4
1. Operational risk management	**0.715**			
2. Performance of SC	0.684	**0.818**		
3. Customer relationship	0.679	0.648	**0.717**	
4. Strategic risk management	0.521	0.744	0.587	**0.794**

Our results satisfy the standards for the cross-loading evaluation and offer strong proof of the discriminant validity of the measurement models (See Table 3). An additional benchmark for measuring framework discriminant validity was the cross-loading values. According to Table 4, each measure, or item on the measuring scale, has a larger loading than any other construct on the underlying latent construct.

Table 3: Cross-loadings

	Operational risks management	Performance of supply chain	Customer relationship	Strategic risks management
ORM1	**0.728**	0.482	0.627	0.339
ORM2	**0.711**	0.389	0.611	0.284
ORM3	**0.701**	0.364	0.609	0.284
ORM4	**0.716**	0.449	0.589	0.311

PRM5	**0.703**	0.431	0.627	0.372
ORM6	**0.776**	0.436	0.695	0.309
ORM7	**0.669**	0.622	0.613	0.511
ORM8	**0.707**	0.556	0.613	0.372
ORM9	**0.723**	0.637	0.658	0.529
PSC1	0.518	**0.828**	0.612	0.576
PSC2	0.564	**0.829**	0.632	0.602
PSC3	0.546	**0.808**	0.552	0.523
PSC4	0.591	**0.868**	0.617	0.599
PSC5	0.616	**0.842**	0.678	0.599
PSC6	0.595	**0.866**	0.675	0.698
PSC7	0.473	**0.666**	0.487	0.647
CR1	0.735	0.483	**0.768**	0.373
CR2	0.624	0.626	**0.702**	0.475
CR3	0.508	0.644	**0.701**	0.483
CR4	0.496	0.532	**0.700**	0.366
CR5	0.753	0.493	**0.799**	0.418
CR6	0.644	0.387	**0.724**	0.295
CR7	0.662	0.454	**0.737**	0.359
CR8	0.596	0.637	**0.703**	0.557
SRM1	0.497	0.772	0.553	**0.768**
SRM2	0.241	0.445	0.319	**0.738**
SRM3	0.275	0.462	0.366	**0.758**
SRM4	0.249	0.438	0.325	**0.749**
SRM5	0.456	0.587	0.494	**0.757**
SRM6	0.537	0.659	0.568	**0.816**
SRM7	0.46	0.615	0.503	**0.877**
SRM8	0.438	0.598	0.469	**0.873**

3.3. Structural model analysis

SmartPLS 4 graphics are created using the analysis process. The diagram is shown in Figure 2, and the path of the hypotheses put forward in the structure determines the direction of the arrows connecting the constructions of this study. Additionally, Figure 2 displays the mediating role that Customer relationship plays and each item's inner model bootstrapping results.

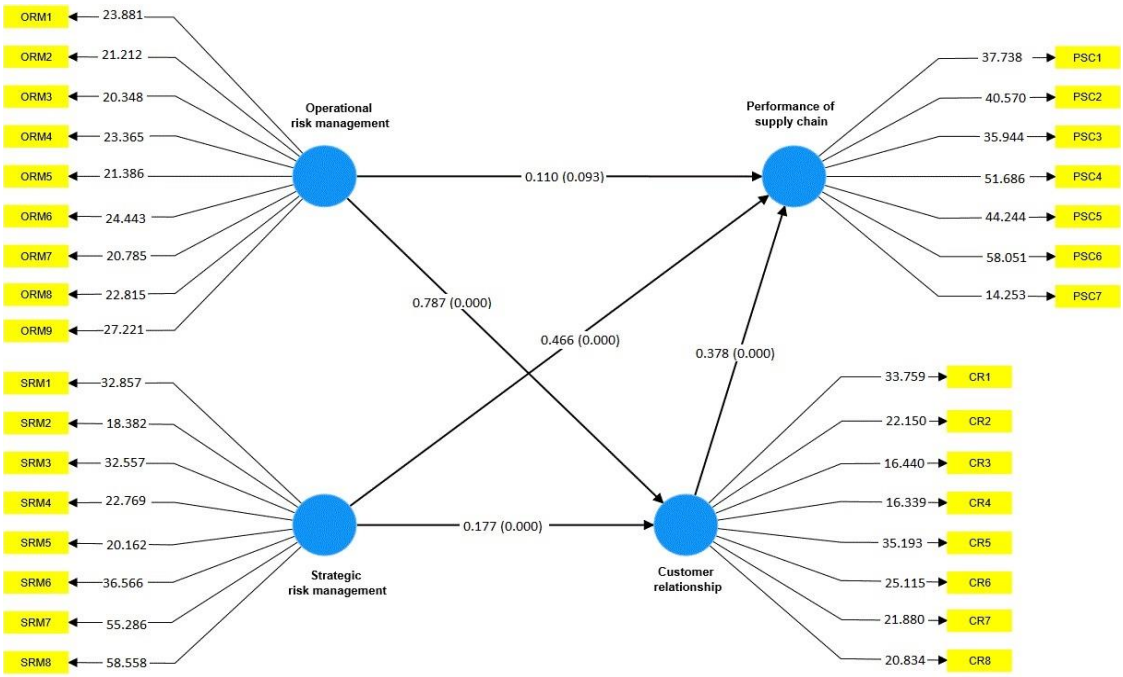

Figure 2: Inner model bootstrapping result

3.4. Hypotheses testing results

Replicating presumably related latent variables and determining whether to accept or reject the proposed hypotheses are done using the PLS-SEM bootstrap. The validity assumptions are based on how relevant the structural relationships are. Balluerka, Gómez and Hidalgo (2005) indicate that the null hypothesis can be accepted if a p-value of less than 0.01 is present or rejected when the critical value is exceeded by the test statistic.

Table 4: Hypotheses testing results and summary of path coefficients

	Hypotheses relationship	Beta Values (β)	Standard Deviation	T Statistics (|O/STDEV|)	P-Values
H1	Operational RM → Performance of SC	0.112	0.063	1.742	**0.083**
H2	Operational RM → Customer relationship	0.786	0.022	34.555	**0.000**
H3	Customer relationship → Performance of SC	0.377	0.065	5.734	**0.000**
H4	Strategic RM → Performance of SC	0.465	0.035	12.816	**0.000**
H5	Strategic RM → Customer relationship	0.176	0.027	6.351	**0.000**

Table 4 summarizes the investigation results. It illustrates the connection between each research construct's outcome and the route coefficients, STDEV (standard deviation), and P-value (probability value). The analysis found that operational RM is not impacting and statistically performance of SC (β = 0.112; t-value = 1.742; p=0.083) that was both adverse

and statistically insignificant to the performance of SC. This finding suggested that H1 is not supported. Operational RM and customer relationship were positively correlated with (β =0.786; t-value =34.555; p=0.000), accordingly, H2 is supported. Analysis result for H3 were (β =0.377; t-value =5.734; p =0.000), therefore, there are positive impact with the relationship among the customer relationship and the performance of SC and H3 were supported. H4, The expected relationship between strategic RM and SC performance was verified, and the path coefficient (β=0.465; t-value=12.815; p=0.000) showed a favorable impact. Given that H5 is supported, there is a strong correlation β (= 0.176; t-value=6.351; p=0.000) between strategic RM and customer relationships.

3.5. Mediation effect

Table 5 presents the process of bootstrapping results which is significant examination of indirect effect. The results showed that, for a route coefficient (t-value = 5.495; p = 0.000; β = 0.297), customer relationship significantly mediates the connection among operational RM and the performance of SC. Also, the results showed that, for a route coefficient (t-value = 4.438; β = 0.067; p = 0.000), customer relationship significantly mediates the connection among strategic RM and performance of SC.

Table 5: Mediation Effect

Correlation	Sample Mean (M)	Original Sample (O)	T Statistics	Standard Deviation	P-Values
ORM → CR → PSC	0.296	0.297	5.495	0.054	**0.000**
SRM → CR → PSC	0.066	0.067	4.438	0.015	**0.000**

Mediation Effect of customer relationship on operational RM and strategic RM on the performance of SC

4. Discussion and Implications

First, a result of this study shows that operational RM not significantly impacts the performance of SC in agro-industrial. This result is differing with the findings of Chen, Sohal

and Prajogo (2013), which agreed that operational risk in the SC affects the effectiveness and performance of the supply network. Therefore, the degree to which the board and senior management oversee the organization's actions, systems, processes, and products is reflected in the effectiveness of operational risk control (Teplická & Hurná, 2019). Second, the empirical result shows that operational risk management positively influences the customer relationship. Operational risk management, especially in agro-industrial firms, is essential for the success of the business (Ruiz-canela, 2021). Operational risk management is essential to managing the interactions with customers in many organizations. The significance of operational risk management within a company has been highlighted more as a result of this perspective. Also some studies clarify that, customer complaints and relationships are one effect of ineffective operational risk management (Hamzah, Lee and Moghavvemi, 2017; Fareen, Rahim and Ahmed, 2019).

Third, a result of this investigation indicates that the customer relationship positively impacts the performance of the SC. This result supports the findings of Huo et al. (2018), which clarify that the performance of the SC is influenced by customer relationships, and customer relationship orientation improves the performance of the upstream SC (between company and supplier). Fourth, the outcome of this study shows that strategic risk management has a major influence on the downstream SC's performance. Studies have shown that strategic SCRM enhances SC performance by lowering operational gaps, boosting awareness, and inhibiting SC interruptions (Fan et al., 2018; Munir et al., 2020). Also, companies can enhance and reinforce the performance effects of their integration processes with suppliers in risky environments by implementing strategic SCRM methods.

Last but not least, our study's findings indicate that strategic risk management influences the company's customer relationship. Similarly, the recent study result of Amin *et al.* (2023) state that risk management strategies could lead businesses to reevaluate their relationship definitions, which would enhance both organizational performance and consumer relationships. According to a different viewpoint, minimizing SC risks is important to creating value because it specifically includes lowering the negative impacts on output (Soni et al., 2014).

4.1. Theoretical implications

On the theoretical level, the study agreed so far SCRM has focused on the relations between the focal company and the suppliers. They scrutinize industrial relations at the

upstream level of the chain by considering the uncertainty of demand as a variable. This research contributes to apprehending disruptions in demand managers to mitigate risks in SC as risk resulting from managerial practices within companies. These practices can impact the daily conduct of business and be considered operational risks, just as they can engage the firm's specific activities over an extended period. In this case, it will be strategic risks. Similarly, integrating the customer relationship updates the significance of relationships marketing in industry activities. On the practical level, the managers of agro-industrial companies hitherto accustomed to theoretical developments on the market approach strategy will find one more tool to become aware of the risks they incur when their organization is centralized or not, when they outsource certain activities, when they manage their commercial relations with transparency or when they engage in promotional campaigns on a regular or less regular basis.

4.2. Managerial implications

This research invites commercial and SC managers to consider risks and offers them some managerial practices capable of mitigating their effects in the event of an occurrence. Managers should develop methods for identifying, addressing and managing operational and strategic risks. A number of businesses have used SCM to improve productivity and accomplish particular organizational objectives, like enhancing customer value, establishing efficient use of resources, and raising effectiveness to strengthen their position in the market. Thus, managers focus their efforts on building a strong reputation based on customer satisfaction outside the firm or on the interior organization of the firm to maximize the resources at their disposal.

The findings of this research demonstrate a favorable relationship among performance, customer connections, and SCRM. Thus, managers control risk by establishing a calm environment in which they may train themselves to anticipate erratic market developments. It is recommended that exterior cooperation can greatly enhance SC performance when companies handle SC risks and uncertainties. The delicate handling needed for these products explains why some agro-industrial managers are hesitant to trust subcontractor carriers with them. On the other hand, data indicates a strong and favorable correlation between performance and risk management. This results in managers being invited to specify the requirements precisely and choose the service provider wisely in order to help the business accomplish its goals.

5. Conclusion

The findings of this paper have important implications for policymakers, practitioners, and researchers. For policymakers, the findings suggest that they should develop policies that support the adoption and implementation of SCRM in agro-industrial firms. For practitioners, the findings suggest that they should focus on developing SCRM capabilities in order to improve their performance. For researchers, the findings suggest that they should conduct further research on the role of SCRM in agro-industrial firms in Africa, particularly in the context of new and emerging risks. Research on RM and the performance of the downstream SC of agro-industrial firms is an exploratory approach to the supposed links between contingency management practices and the commercial achievement of industrial entities. Its conduct required adopting an approach combining theory with contextualized reality in developing countries.

This research verifies whether SCRM (operational RM and strategic RM), and customer relationship influences the performance of SC in agro-industrial companies. And in addition, this study examines the impact of operational RM and strategic RM on customer relationships. The findings imply that effective operational RM and customer relationship management will enhance organizational SC performance. Like the ISO 9000 quality standard, SC managers can use it as an audit framework to control risks and uncertainties and achieve targeted SC performance.

Because of improvements to the infrastructure, changing organizational structure, and business environment, operational risk must be managed. In our opinion, RM techniques can enhance business operations and customer relationships. We strongly suggest that firms can also use proactive SC technologies, especially those that address issues with supplier quality, improve supplier performance, and prevent supply disruptions. In view of the RM techniques provided in this study, businesses may review their relationship definitions, enhancing both organizational performance and customer relationships. The managers of firms in developing nations could be encouraged by this study to implement the transport outsourcing approach. Future studies will analyze the relationship definitions of other organizations in the context of the RM techniques discussed in this study, which should enhance organizational performance and customer connections.

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7. Declaration of interest statement

The authors report there are no competing interests to declare.

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