Optimizing supply chain performance in Somali SMEs: The role of internal and external integration

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A R T I C L E I N F O

A B S T R A C T

This study explores how supply chain integration (SCI) affects the performance of small and medium-sized enterprises (SMEs). Data were gathered through surveys from SMEs in Mogadishu, Somalia, involving supply, logistics, and operations managers as well as employees. The findings indicate that SCI significantly enhances performance in areas such as cost efficiency, product quality, delivery timeliness, and operational effectiveness. The study highlights the importance of not only internal integration but also strong connections with suppliers and customers. It adds to existing research by providing empirical evidence on the performance benefits of supply network integration and the factors driving these improvements. The study recommends that managers adopt a comprehensive strategy to strengthen both internal integration and collaboration with external supply chain partners.

1. Introduction

The number of small and medium-sized enterprises (SMEs) has risen in recent years. In numerous developing nations, a high rate of unemployment has led individuals to start their own enterprises on a small scale and with minimal investment (Ejdenberg, 2016). Encouraging the growth of SMEs is a highly effective strategy for promoting economic prosperity in any nation (Dinesh and Sushil, 2019).

SMEs have a significant role in enhancing societal well-being (Bayraktar and Algan, 2019; Cerchione et al., 2018; Redmond et al., 2016; Kesk et al., 2017). Their entrepreneurial spirit, agility, and innovative capabilities empower them to adapt to market demands, fostering individual and national progress (Subburaj et al., 2020). As globalization reshapes markets, SMEs encounter unique challenges and opportunities, particularly in countries marked by economic and infrastructural complexities (Asnordin et al., 2021; Vasilescu, 2014). Many SMEs fail to reach their full potential due to insufficient coordination and collaboration among their partners in the supply chain (Subburaj et al., 2020).

In the business context, supply chain performance (SCP) measures a company's supply network, including suppliers, manufacturers, distributors, and logistics partners. SCP involves the company's strategies and practices to control the movement of products, information, and funds from the source to the end user (Prajogo and Olhager, 2012). Performance evaluations of the supply channel are the responsibility of the company's supply management division. Depending on the demands of the business, the supply management division may be a distinct entity or fall under the functional area of operations (Waluyowati et al., 2018). For companies trying to improve the performance of their supply chains, supply chain coordination has become a crucial strategic function (Pfanelo, 2017).

The existing literature consistently demonstrates the immense impact of SCI on improving performance in various sectors (Koçoğlu et al., 2011; Flynn et al., 2010; Zhu et al., 2018; Liu and Lee, 2018). This growing understanding emphasizes that enterprises must collaborate and synchronize their operational procedures with channel partners, particularly for underperforming SMEs. In Somalia, where SMEs are pivotal contributors to the economy, understanding how integrating supply partners affects performance is paramount (Hassan, 2022).

Despite the importance of SCI, little is known about its effects on SMEs in the Somali setting. A knowledge gap results from the absence of comprehensive study on the link between SCI and

SMEs' success in Somalia. This paper seeks to fill this knowledge gap by analyzing the dynamics and consequences of SCI on the performance measures of SMEs functioning in the socio-economic environment of Somalia.

This study mostly aims to investigate the relationship between SCI and SMEs' SCP in Somalia. By reaching this goal, the study intends to add to theoretical knowledge in supply chain management, especially in least-developed countries, and useful insights that might guide policies for SMEs, legislators, and practitioners in Somalia. The results of this study have ramifications outside of scholarly conversation. The results of the study provide insightful analysis for small and medium-sized companies that shape their supply network strategic choices. Policymakers can use this information to create focused interventions to help SMEs improve their supply chain process and build economic resilience. Moreover, practitioners will learn important lessons on streamlining supply chain operations, which will help Somalia's economy to grow generally.

2. Literature review

2.1. Dynamic capability theory (DCT)

The present work extends the "resource-based view" (RBV) through the application of DCT. DCT advises companies to improve their competitive edge by means of efficient resource integration, development, and change adaptation. SCM literature offers much discussion on DCT theory. For instance, Mandal (2017) investigated how various forms of visibility affect "Supply Chain Resilience" (SCRES) resulting in performance. Using this approach, Brusset and Teller (2017) also investigated how lower-order skills might improve "supply chain resilience." Under the scope of our research, the acceptance of DCT is based on the idea that companies must show flexibility by changing their supply chain strategies and fostering improved interaction with suppliers and customers.

2.2. Supply chain integration (SCI)

SCI refers to the organization of activities among suppliers, manufacturers, and distributors in such a way that there is timely delivery of products to the final consumer (Okoduwa et al., 2024; Zhang et al., 2022). Effective SCI necessitates not just internal and external collaboration, but also substantial coordination and alignment to guarantee that all parties involved are working efficiently to achieve the common objective (Alshurideh et al., 2022). According to Mahama (2024), with good SCI, modern businesses can respond to the needs of consumers in time. Through internal and external integration of channel members businesses can accomplish targeted performance goals. Akam et al. (2023) further added that SCI strengthens operational

performance along with decision-making capabilities, which in turn enhances strategic and financial performance (Mahama, 2024). The research by Alzoubi et al. (2022) indicated that the integration of supply chain networks increases consumer satisfaction, and efficiency in operations, along with a competitive advantage. Akam et al., (2023) argued that SCI strategies allow organizations to reduce costs, enhance customer satisfaction, and better coordination among supply partners.

Tarigan and Siagian (2021) conducted research on how SCI affects organizational performance in Indonesia's manufacturing industries. A total number of 470 questionnaires were distributed for data collection and analyzed using SEM-PLS. The research showed that SCI had a positive impact on innovation systems, supply chain adaptability, and supply chain robustness since it allows the sharing of relevant information both about products and about planning production. Again, it pointed out that innovation systems and adaptability positively contribute to resilience, and thus help the firms tackle sudden demand shifts and problems with production processes. Gamachu and Patrick (2023) attempted to investigate supply chains' integration in the Ethiopian textile industry. The researchers applied the quantitative approach, collecting data from 385 industry respondents using questionnaires. Exploratory and confirmatory factor analyses have been used to analyze the data. The results showed that SCI in the Ethiopian textile industry is influenced by factors related to macro-level operations and decision-making.

2.3. Customer integration (CI)

CI refers to the extent to which a business engages with its customers to improve cooperation and streamline collaborative planning. CI has a positive effect on SCP as it allows companies to treat their interactions with customers as a unified entity and effectively meet market demands (Stevens, 1989; Wong et al., 2015). To achieve a strong level of CI, organizations need to engage with their consumers actively, understand their preferences, culture, and demands, and promptly address their needs (Lotfi et al., 2013). Tukamuhabwa (2023) focused on how CI and information sharing influence SCP in China. A total of 208 respondents participated in the survey. Data was analyzed through correlation and regression approaches. The result of the study proved the positive influence of CI and information sharing on SCP, directly and indirectly. Therefore, the findings suggest that CI and information sharing are the key variables that impact the performance of supply chains. Similarly, Yeh et al. (2020) stated that incorporating customers, strategically sharing information, and encouraging Collaboration between key manufacturers and those they serve are critical for improving customer demand planning. Supply chain partnerships, customer orientation, flexibility, product innovation, and supplier and CI are proven

to enhance operational performance (Ku et al., 2016). This study intends to examine the association between CI and SCP, as discussed in the literature above. Thus, hypothesis H1 is suggested:

H1: CI positively impacts SCP.

2.4. Internal integration (II)

II emphasizes the need for a company's several divisions and functional segments to cooperate as an integrated team. By driving cooperative efforts to meet consumer wants and breaking conventional functional limitations, II is intended to enhance performance results (Flynn et al., 2010).

Integration within the organizational structure fosters Collaboration among internal functions (Wong et al., 2015). It emphasizes departments or segments inside the businesses through a unified procedure connecting them. Inadequate internal coordination and diversification in each team's goals may result in duplicated duties and inefficient use of resources, ultimately impacting quality and cost-efficiency (Huo, 2012). Furthermore, internal alignment promotes the spread of relevant knowledge and enables information exchange (Prajogo and Olhager, 2012).

By sharing knowledge about activities that increase value among different teams, SMEs can optimize contemporary supply chains, promoting better cooperation between suppliers and consumers. According to Yu et al. (2013), the level of intra-organizational integration demonstrates a positive and statistically significant relationship with the level of inter-organizational integration. Research conducted by Huo et al. (2014) indicated that increased levels of II positively influence business performance. Therefore, we proposed H2:

H2: II positively impacts SCP.

2.5. Supplier integration (SI)

SI requires the establishment of strong and unified relationships with suppliers that are in line with a company's fundamental business activities. Businesses can form strategic partnerships with their suppliers (Kesk et al., 2017). Som et al. (2019) investigated the potential of SI as a valuable tool for managers to attain favorable results in their supply network. In their study, Kumar et al. (2017) found that SI positively influences supply network performance. This is further supported by Fariz (2022), who also highlighted the role of transformational leadership in enhancing this relationship. Prajogo and Olhager (2012) stated the importance of establishing reliable and lasting partnerships with suppliers to improve the coordination of material and information, leading to greater efficiency in operations.

Gamachu and Patrick (2023), researched how SI influences the performance of the supply chains of South African SMEs. With its focus on Gauteng Province, it adopted a quantitative approach in which data was gathered from 283 owners and managers of SMEs and subsequently analyzed through Pearson's correlation and regression techniques. The results showed that SI correlated positively with the tangible and intangible aspects of SCP, with SI also being able to predict improved performance in both dimensions. These studies highlight the essential role of SI in improving efficiency within the supply chain. In line with these studies, we suggested H3:

H3: SI has a positive influence on SCP.

2.6. SCP

SCP is increasingly essential to attaining a competitive edge (Balfaqih et al., 2016). It enhances organizational efficiency, customer satisfaction, and profitability (Negi, 2021). Previous studies have used various performance measures, such as cost, quality, and customer responsiveness (Whicker et al., 2009; Deshpande, 2012; Qrunfleh and Tarafdar, 2014; Lee et al., 2022).

Managers are usually responsible for their companies' performance, but an organization's long-term success depends on how well its supply network operates (Fatorachian and Kazemi, 2021). However, supply network managers must also focus on the external context and consider how their strategies affect other partners within the supply network. In this regard, Mukhtar and Azhar (2020) argued that strengthening supply network performance requires a collaborative and strategic approach among all entities in the supply web, working together to achieve their respective objectives. The effectiveness of the supply network is dependent on the partners' ability to adapt to dynamic environments.

Previous research has yielded mixed findings regarding "the impact of SCI on SCP." This inconsistency could be attributed to variations in definitions and measures of firm performance used across studies. Therefore, a comprehensive investigation is needed to clarify these relationships and provide more conclusive insights. Based on the conceptual model in Fig. 1 shown below, the study will investigate the influence of SCI on SCP.

3. Methodology

To test the hypotheses, the study employed a cross-sectional survey design and distributed questionnaires. The study focused on executive managers, supply chain and logistics managers, and staff of supply chain units at SMEs located in Mogadishu, Somalia. The objective was to comprehensively explore the relationship between the various elements of SCI and the overall effectiveness of SCP. Data was collected in January and March of 2024. The study used a nonprobability sampling method called purposeful or judgmental sampling. The non-probability sampling used

provided the researcher with the ability to choose those that are likely to provide relevant and insightful data based on expert opinions and familiarity with the operation of supply activities. Given that there is no comprehensive sampling frame for SMEs in the city, this purposeful sampling was particularly fitting since it could effectively capture data from knowledgeable respondents within the scope of the present study. Nevertheless,

limitations in the form of possible bias in selection and lower generalizability, which are characteristic features of this approach, were weighed against a rigorous process for data analysis. The present study, therefore, adopted standardized questionnaires from literature sources to alleviate the limitation of response bias. Content validity and consistency of measures were applied (Etikan and Bala, 2017).
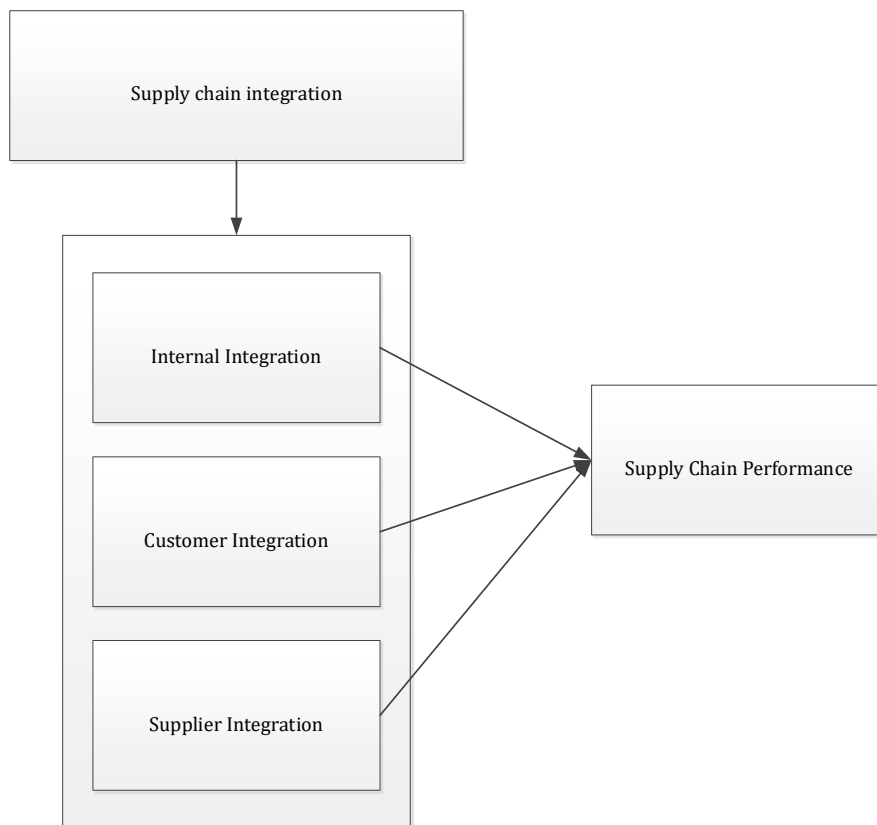

Fig. 1: Conceptual framework of the study

A standardized questionnaire consisting of five distinct sections was used to conduct a quantitative survey. The parts included vital personal data, II, customer and SI, and ultimately, SCP. The items of the questionnaire were derived from literature sources to ensure the validity of the content. The elements pertaining to the performance of the supply chain, as well as the integration of customers, suppliers, and internal processes, were derived from the works of Kim and Narasimhan (2002), Vickery et al. (2003), and Huo (2012). The data that was gathered was evaluated using the widely used method of structural equation modeling with partial least squares (PLS-SEM), as explained by Kaufmann and Gaeckler (2015).

The choice of using PLS-SEM for this investigation was considered suitable based on the characteristics of the model and the size of the sample. The statistical analysis was conducted using SmartPLS 4 software, which employed bootstrapping to estimate the significance levels of relationships. Additionally, the Partial Least Squares (PLS) algorithm was used to evaluate measures of convergent validity, such as average variance

extracted (AVE), Cronbach's alpha, and composite reliability.

4. Results and discussion

4.1. Descriptive statistics

The study surveyed 311 participants. Regarding gender distribution, most respondents, 180 individuals (57.9%), were male, while 131 (42.1%) identified as female. In terms of age, among the participants, 24 (7.7%) are less than 30 years old, 246 (79.1) aged between 31-40 years, followed by 27 (8.7%) aged 41-50, followed by 14 (4.5%) aged above 51 years. Most of the respondents were the young generation. Regarding education level, most of the respondents 246 (86.5% held a bachelor's degree, followed by 23(7.4%) with postgraduate certificates, 10 3.2 of the respondents were primary or below and the rest 9(2.9%) were secondary level. According to participants' job positions the majority 262 (84.2%), were supply chain department staff, followed by 37(11.9%) were supply chain managers and the remaining 12(3.9%) were logistics

managers. As shown in Table 1, the study surveyed 311 participants.

4.2. Measurement model

The measurement model underwent analysis to evaluate both convergent and discriminant validity.

4.3. Convergent validity

Lu et al. (2011) defined convergent validity as a measure of internal consistency that evaluates the degree of correlation between items within a scale to establish a common underlying concept. This examination utilizes many statistical metrics, such as average variance extracted (AVE), factor loading, Cronbach's alpha, and composite reliability (CR). The study revealed that the item loadings exceeded the

0.7 threshold. Table 2 demonstrates that the average variance extracted (AVE) surpassed the threshold of 0.5. In addition, the Dijkstra-rho (A), Henseler's (B), and Jöreskog's (C) rho values were all higher than 0.7. The fact that all three criteria passed their respective threshold values demonstrates that they satisfied all the criteria.

4.4. Discriminate validity

This study used the Fornell-Larcker criterion, which is well-known and used in the research field broadly. Table 3 shows that the constructs exhibit enough discriminant validity since the square root of the average variance extracted (AVE) surpasses the correlation among the reflecting constructs.

Table 1: Respondents' profile

Distribution		Frequency	Percent
Sex	Male	180	57.9
	Female	131	42.1
Age	Less than 30 years	24	7.7
	31-40 years	246	79.1
	41-50 years	27	8.7
	51 and above	14	4.5
Education	Primary or below	10	3.2
	Secondary	9	2.9
	Tertiary/university	269	86.5
	Postgraduate	23	7.4
Position	Supply chain department staff	262	84.2
	Supply chain Manager	37	11.9
	Logistics Manager	12	3.9

Table 2: Convergent validity

Construct	Items	Loadings	Cronbach's alpha	AVE	CR
CUSTI	CUSTI1	0.966	0.978	0.919	0.983
	CUSTI2	0.963			
	CUSTI3	0.962			
	CUSTI4	0.956			
	CUSTI5	0.947			
INTI	INTI1	0.983	0.987	0.963	0.990
	INTI2	0.984			
	INTI3	0.981			
	INTI4	0.977			
SUPI	SUPI1	0.943	0.965	0.904	0.974
	SUPI2	0.946			
	SUPI3	0.946			
	SUPI4	0.968			
SCP	SCP1	0.979	0.992	0.969	0.994
	SCP2	0.981			
	SCP3	0.992			
	SCP4	0.982			
	SCP5	0.989			

Table 3: Fornell–Larcker criterion

	CUSTI	SUPI	INTI	SCP
CUSTI	0.959			
SUPI	0.955	0.981		
INTI	0.941	0.978	0.985	
SCP	0.958	0.968	0.954	0.951

4.5. Structural model

The current study utilized Partial Least Squares (PLS) regression, a modified multiple linear regression model version. The structural model's evaluation should include various statistical measures such as R-squared and t-values. A bootstrapping approach with a resample size of

5000 is recommended to ensure reliable estimates. The results of the assessment of each matrix and parameter in this study are presented in Table 4 and Fig. 2.

The study's findings revealed that CI exhibited a T value of 1.561 with a p-value of 0.119, indicating a statistically insignificant relationship with SCP. Conversely, II, and SI demonstrated t-values of 10.691 and 1.728, respectively, all with p-values below 0.05, indicating significant positive relationships with SCP.

Fig. 2 shows that the R-squared coefficient is 0.957, indicating that all three components of CI, SI, and II explain approximately 95.7% of the variation

in SCP. This suggests that these independent variables together account for 95.7% of the variation in SCP, while the remaining 4.3% of the difference is caused by other factors that were not considered in this study.

Table 4: Hypothesis testing results

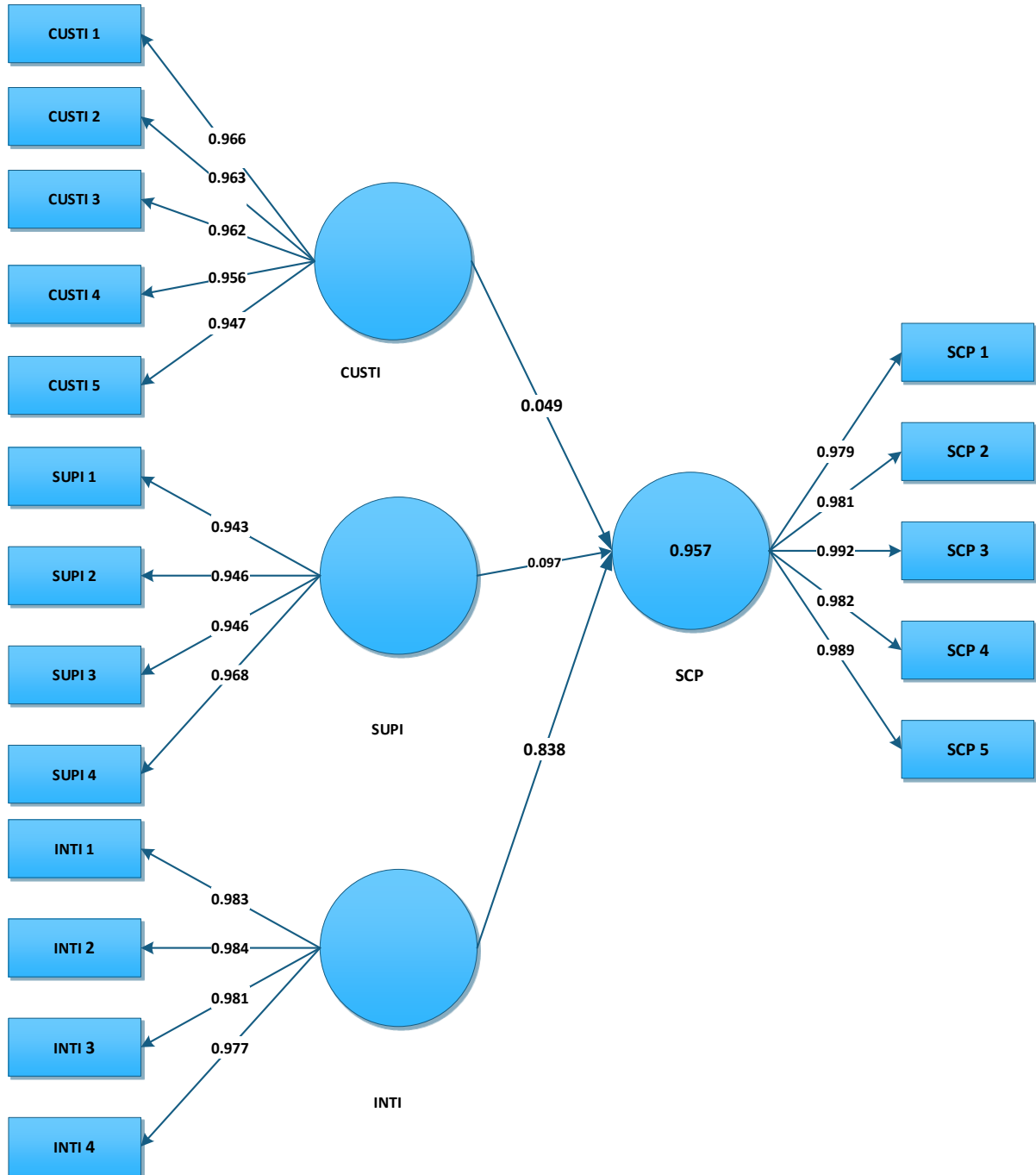|	Sample means (M)	Standard deviation (SD)	T-statistics	P-value	Decision
CUSTI ->SCP	0.051	0.031	1.561	0.119	Not supported
INTI -> SCP	0.833	0.078	10.691	0.000	Supported
SUPI -> SCP	0.099	0.056	1.728	0.002	Supported

Fig. 2: R-squared coefficient showing predictors of SCP

Hypothesis 1 surprisingly (H1) posited that CI would not influence SCP within the context of SMEs. The result revealed that there is no relationship between CI and the effectiveness of supply chains for SMEs. As exhibited a T value of 1.561 with a p-value of 0.119, indicating a statistically insignificant relationship, therefore this hypothesis (H1) was rejected. Hypothesis 2 (H2) suggested a positive association between II and SCP within SMEs. The T-statistic value obtained from the statistical analysis was 9.522, with a p-value less than 0.001. These results confirm the presence of a positive linear correlation between II and SCP. Such results are consistent with the findings of Huo (2012), which highlighted that highly internally integrated organizations are posited to obtain high

performance in their supply chains. Similarly, Yu et al. (2013) and Yuen and Thai (2016) supported this; their studies collectively highlight the importance of II in driving SCP.

Hypothesis 3 (H3) was verified by establishing a positive relationship between SCP and SI, as indicated by a t-value of 3.448 and a p-value of 0.001 at the 0.05 significance level. This finding is further substantiated by Fariz (2022), who highlighted the positive effect of SI on SCP, particularly when combined with transformational leadership. Similarly, Kumar et al. (2017) indicated the importance of SI in enhancing SCP.

Based on the above discussion, The findings of this study highlighted that II and SI have a statistically significant relationship with SCP; conversely, the relationship between CI and SCP was not supported despite previous research (e.g., Chiang et al. (2015) and Ku et al. (2016)), which supported that there is a significant relationship between CI and SCP. The difference may be due to the unique constraints of local SMEs, such as a lack of a system for integrating customers, scarcity of resources, and market conditions.

Furthermore, the findings in this regard will confirm the DCT, as the result of the study will reveal how meaningful II and SI are to SCP in the SMEs in Somalia regarding resource reconfigurations and collaboration with suppliers. However, no significant relation between CI and SCP reveals that these SMEs are less capable of developing dynamic capabilities concerning customer interaction, probably due to resource limitations and limited integration systems. Again, this reflects the context-specific application of DCT in these SMEs, emphasizing internal and supplier-focused strategies as a means of enhancing performance in an adverse market environment.

5. Conclusions

The main aim of this research is to explore the relationship between internal and external integration and the performance of supply chains, thus adding to the theoretical understanding of SCM. By examining a model that links downstream with external customers and upstream with suppliers, internal coordination, and SCP, this study seeks to uncover the direct correlation between improved internal and external integration and enhanced performance. The outcomes of this study are anticipated to advance SCM theory by clarifying how enhancing the coordination within and across supply channel members positively impacts supply efficiency. According to the findings of the research, II and external integration with suppliers improves the performance of SMEs, thus managers should pay more attention to covering the whole system rather than only their own. Their objectives are to enhance internal procedures and strengthen close relationships with suppliers. From this all-encompassing approach, there will be expected improvements in quality, delivery, flexibility, and cost control. Furthermore, the study underlined the need to collaborate with partners to raise the performance of the organization. Good integration increases performance, which boosts customer satisfaction and financial results by itself. Therefore, this work contributes to the body of present SCM research by offering a structural model to investigate the complex interactions among external partnerships, internal factors, and firm success.

Future research should look at these dynamics in different locations or contexts to fully understand integration and how it influences performance. This can involve investigating numerous sectors or fields to compile the several elements influencing integration and performance.

Acknowledgment

Compliance with ethical standards

Ethical considerations

This study followed ethical guidelines with informed consent obtained from all participants. Data were collected anonymously and kept confidential for academic use only. The study was approved by SIMAD University's Ethical Review Committee, adhering to the Declaration of Helsinki principles.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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