

# The Impact of Supply Chain Integration on Operational Performance of Saudi SMEs

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**Abstract**— This study investigates the effect of supply chain integration (SCI) on the operational performance of small and medium-sized enterprises (SMEs) in Saudi Arabia, with a focus on the Asir region. Analyzing data from 118 SMEs, it examines how internal integration, alongside customer and supplier integration, influences operational and business outcomes. The research reveals that internal integration is pivotal for enhancing both operational and business performance, while supplier integration significantly boosts operational efficiency, underlining the importance of strategic supplier relations. Conversely, customer integration is found to improve business performance, stressing the value of meeting customer demands for competitive advantage. The study challenges existing assumptions regarding the comprehensive benefits of multi-faceted SCI approaches, suggesting a need for strategies that are more finely tuned to the context of Saudi SMEs. It advocates for a phased SCI strategy, emphasizing initial internal integration before extending to external partnerships, and suggests targeted resource distribution reflecting the distinct impact of each integration aspect on performance. The findings provide valuable insights for both practitioners and researchers, indicating directions for future studies on SCI's role in emerging markets and its variable effects based on different environmental factors.

**Keywords**— Business Performance, Customer Integration, Emerging Markets, Internal Integration, Operational Performance, Saudi Arabia, Small and Medium-Sized Enterprises, Strategic Relationships, Supplier Integration, Supply Chain Integration.

## I. INTRODUCTION

Currently, small and medium-sized enterprises in the manufacturing sector are operating in a multifaceted and unpredictable landscape. Nadia et al. point out that the proliferation of global rivalry distinguishes this environment, as also the instability of markets, and the escalating complexity of technological advancements [1]. This phenomenon is more prevalent in developing countries than in developed nations. The acquisition of orders is contingent upon attaining competitive advantage, which encompasses the capacity to effectively use a range of competencies that demonstrate the comparative superiority of the individual SMEs over their rivals Barbra [2]. The SME sector is a crucial catalyst for economic progress in established and emerging nations, including Asia and Africa [1], [3]. Considering the Kingdom of Saudi Arabia, there has been a significant rise in economic reliance on SMEs in recent years, with the evolutionary 2023 vision making Saudi SMEs a substantial pillar in several economies [4].

Several studies have examined the relationship between supply chain management practices and overall organizational performance from multiple perspectives. For instance, Alahmad [5] found precious insights into appropriate practices that significantly impact the overall average performance of supply chains in Saudi Arabia. Issues comprising delivery chain-making plans, purchaser relationship control, and dealer courting management are believed to be related to organizational performance.

The agile strategy is an essential topic that features prominently in the analysis of the effect of SCI on the organization's overall performance in the context of Saudi Arabian SMEs. According to Aboalghanam and Awad [6],

adopting the agile technique to deliver chain management enables decisive and brief responses to surprising possibilities in the delivery and call for merchandise. The authors note that an agile supply chain emphasizes efficient strategies and empowered employees. Therefore, structures built on agile supply chain practices are nimble enough to allow one to respond quickly to emerging troubles in the delivery chain. Thus, the agile approach significantly impacts the general performance of businesses in Saudi Arabia and around Jordan. The authors [6] also highlight the importance of other issues, together with the mediating characteristics of supply chain practices and client relationships, losing moderation on how agility affects the overall delivery chain popular common overall performance.

Strategic orientations are crucial to a company's strategic planning, organizational success, and supply chain control. The three strategic orientations of client, product, and competitor enable a business enterprise to refocus and redevelop its supply chain management process to ensure the most reliable performance. Alsadi and Aloulou [7] discussed the strategic orientations of Saudi corporations and how they affect the overall performance, considering supply chain control. The authors revealed the significance of strategic alignments and their implications for well-known modern commercial employer organizations' typical performance. Moreover, AlMulhim [8] discussed the role of digital technologies in clever delivery chains and their verbal effect on overall organizational performance. They emphasized the impact of virtual technology, creating new views on how generation-pushed techniques contribute to advanced supply chains and the standard performance of business enterprises. Another critical issue of expertise on the impact of deliver chain integration on corporation performance amongst Saudi

SMEs is cooperation for supply chain improvement. This perspective is well discussed by Ferrer [9], who explored the idea of cooperation to improve the delivery chain control practices of businesses to improve overall performance. The observation shed light on collaborative techniques and their impact on the performance of producing delivery chains in the Saudi context.

## II. RESEARCH METHODOLOGY

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### A. Study Population

The population targeted in the current study consisted of 120 business organizations operating in the Asir region. The Small and Medium Enterprise Bank (SMEB) is the relevant body in the Kingdom of Saudi Arabia that oversees SMEs in the country. Such enterprises are classified based on several factors like employees' salary, annual earnings, number of employees, etc. The factor used in previous research and validated in the country to classify SMEs is earnings. According to SMEB definitions, firms with earnings of less than three million Saudi Riyals (SR) are micro-enterprises, and those with earnings from 3 million to 40 million SR are considered medium enterprises.

The current study's respondents are top-level supply chain managers with sufficient expertise in their organization's operations, procedures, supply chain, and performance departments. Since only a few people have the information sought, a combination of judgment sampling and snowball approach was adopted since they are the most appropriate sampling methods for our purposes. The process entails selecting subjects in the best position to supply the information and requesting them to recommend the next respondent. Accordingly, the appropriate sample size for the current study, given the population size indicated earlier, is 120 companies.

### B. Data Collection Method

Data were collected using both primary and secondary methods. Secondary data came from the Asir Chamber of Commerce. Primary data collection involved distributing a questionnaire to mid-level employees and managers in supply chain departments in SMEs in the Asir region. The questionnaire comprised 48 questions, split into two main sections. The first section gathered fundamental information about the respondents, including industry type and sales volume. The questions were designed to profile the respondents and understand the context of their responses. The second section was concerned with SCI and Operational Performance. The questionnaire in this section was more detailed and divided into five domains: Customer Integration (CI), Supplier Integration (SI), Internal Integration (II), Operational Performance (OP), and Business Performance (BP).

Questions in the CI, SI, and II parts were focused on how well the company integrated customer and supplier feedback

into its operations and how the fit in its internal processes is. On the other hand, the OP and BP parts assessed the efficiency and effectiveness of the company's operations and business success on several levels, including production, logistics, inventory, financial, growth, and sustainability.

The questionnaire was emailed along with a cover letter outlining the objectives and potential contributions of the study. Using follow-up emails, the respondents who filled out the questionnaire and agreed to participate in the study were contacted. In the follow-up email, we asked them to spread the questionnaire to relevant persons matching our criteria.

### C. Validity and Reliability

Since the literature-derived elements were in English, the initial questionnaire was created in English, translated into Arabic by a bilingual translator, and validated by two bilingual writers. The questionnaire was pre-tested on ten persons to ensure readability and easy understanding. In the Asir region, we administered the questionnaire in Arabic, as it is the primary language there.

### D. Statistical Analysis

Summary statistics were used to profile the respondents, applying counts and percentages. Descriptive statistics were also applied, including mean, standard deviation, and Cronbach's alpha. Regression analysis was used to establish relationships between the study elements.

## III. RESULTS

Of a total of 572 companies contacted, 118 filled in questionnaires, with a response rate of 21%. The majority of the respondents (77%) declared sales of less than SR 10 million. Twenty-one percent of the respondents were in the building materials sector.

This study employed hierarchical regression analysis to examine the study hypotheses. Its initial phase involved evaluating the direct impact of internal integration on business and operational performance as a statistical representation of hypotheses H1a and H1b. In the second phase, we examined the correlation between customer and supplier integration and business and operational performance. This analysis was conducted regarding the connection between internal integration and operational or business performance. This stage aligns with hypotheses H2a, H2b, H3a, and H3b. It also examines the correlation between internal, customer, and supplier integration and operational or business performance. As expected, the interactions were examined in two and three ways using the hierarchical regression analysis approach.

The findings pertaining to the hierarchical regression analysis of business and operational performance are found in Tables 3 and 4. According to Table 3, a statistically significant positive correlation exists between internal integration and operational performance, thus supporting hypothesis H1a. Including customer and supplier integration in the model substantially increased the R<sup>2</sup> value (0.75 to 0.89), without accounting for interaction terms. This suggests that incorporating customer and supplier integration, without considering their interactions, made a significant positive

contribution to the model's ability to predict outcomes. However, only the coefficient for supplier integration demonstrated statistical significance ( $p\text{-value} < 0.05$ ). This suggests a direct relationship between supplier integration and operational performance. On the other hand, the coefficient for customer integration was not statistically significant ( $p\text{-value} = 0.662$ ), indicating no significant correlation between customer integration and operational performance. Consequently, the findings provided only limited support for hypothesis H2a.

Table 3 reveals a statistically significant positive correlation between internal integration and business performance. However, importantly, the R2 value associated with this correlation is very low (0.69). These findings support hypothesis H1b. Incorporating customer and supplier integration into the model significantly boosted the R2 value (0.87), even without considering the inclusion of interaction terms. This finding indicates that the inclusion of customer and supplier integration, without considering their interactions, had a notable positive impact on the model's predictive capacity.

Nevertheless, importantly, the customer and supplier integration coefficient solely exhibited statistical significance, as indicated by the p-value of less than 0.05. This observation implies a clear correlation between customer and supplier integration and overall business performance. However, the coefficient pertaining to internal integration did not exhibit statistical significance ( $p\text{-value} = 0.147$ ), suggesting the absence of a substantial association between internal integration and business performance. Therefore, the results favor hypothesis H2b only partially.

The inclusion of interaction terms in the regression model resulted in a significant improvement in its predictive capability for both business and operational performance. Examining the reciprocal interactions between customers and suppliers' integration did not result in any additional enhancements to the business and operational models, as indicated by the R2 score of 0.83 and 0.75, respectively. The statistical analysis revealed no substantial correlation between customer or supplier integration and internal integration, considering two-way and three-way interactions for both models ( $p > 0.05$ ). Hence, despite the observed significant relationship between supplier integration, the combined effects of customer integration and supplier integration did not moderate the relationship between internal integration and

operational and business performance. This outcome is noteworthy as it contradicts hypotheses H3a and H3b, and although the overall models' power was significantly increased, it does not support the hypothesis.

Generally, examining study factors vis-a-vis business performance yielded more favorable statistical outcomes than operational performance. The findings in Table 4 reveal a clear and positive correlation between internal integration and business performance, as evidenced by the high R2 score of 0.87. This supports hypothesis H1b. Including customer and supplier integration in the second step of the analysis resulted in a minimal decrease in the model's predictive power, causing the R2 score to decrease to 0.83. Similarly, including the two-way interaction terms did not cause any statistically significant alterations to the model. In addition, including all interactions involving two and three variables in the model restores it to its initial level of predictive accuracy, as evidenced by an R-squared value of 0.87. Notably, the integration of both customers and suppliers, without considering their interactions, yielded statistically significant correlations ( $p\text{-value} < 0.05$ ) and a model power of  $R^2 = 0.87$ . Therefore, hypotheses H2b and H3b were not supported. While the impact of internal integration on business performance has been extensively studied, the influence of customer integration, supplier integration, and their interactions on business success has received less attention.

TABLE I: Profiles of responding companies.

Industries	%	N
Arts and crafts	8%	10
Textiles and apparel	9%	11
Chemicals and petrochemicals and Electronics and Electrical	14%	17
Rubber and plastics	13%	15
Building materials	21%	25
Wood and furniture	6%	7
Toys	6%	7
Food, beverages and alcohol and Jewelry	11%	13
Metal, mechanical and engineering and Pharmaceutical and medical Publishing and printing	11%	13
<b>Sales</b>		
>5 million	58%	69
5-9.99 million	19%	22
10-19.99 million	9%	11
20-39.99 million	7%	8
40-79.99 million	1%	1
80 million or more	6%	7
<b>Total</b>	100%	118

TABLE II: Descriptive Statistics.

	Correlation coefficients					Cronbach's alpha
	Supplier integration	Internal integration	Customer integration	Operational performance	Business performance	
Supplier integration	1.00					0.93
Internal integration	0.79	1.00				0.94
Customer integration	0.76	0.81	1.00			0.93
Operational performance	0.70	0.72	0.88	1.00		0.91
Business performance	0.74	0.81	0.83	0.82	1.00	0.94
Mean	4.14	4.23	4.28	4.28	4.13	0.95
Standard deviation	1.39	1.34	1.33	1.45	1.46	

TABLE III: Regression results for operational performance.

Model	Independent Variable	Coefficients	t	p-value	R <sup>2</sup>	F	p-value	multiple R
1	Constant	1.26	4.14	0.000	0.49	138.26	0.000	
	Internal Integration	0.73	10.46	0.000				
	Constant	0.99	3.21	0.002	0.52	123.79	0.000	
	Customer Integration	0.78	11.13	0.000				
	Supplier Integration	0.13	0.61	0.542	0.78	417.67	0.000	
2	Constant	0.97	20.44	0.000				
	Internal Integration	0.10	0.46	0.649	0.78	138.26	0.000	0.89
	Customer Integration	0.08	0.97	0.335				
	Supplier Integration	-0.04	-0.44	0.662				
3	Constant	0.94	10.87	0.000				
	Constant	0.74	2.43	0.017	0.56	73.52	0.000	0.75
	Internal Integration	0.36	3.43	0.001				
	Customer Integration	0.48	4.46	0.000				
	Constant	1.41	2.15	0.033	0.57	49.60	0.000	0.75
	Internal Integration	0.16	0.79	0.433				
	Customer Integration	0.33	1.98	0.050				
4	II * CI	0.04	1.15	0.252				
	Constant	-0.26	-0.28	0.784	0.79	58.83	0.000	0.89
	Internal Integration	0.46	1.05	0.295				
	Customer Integration	-0.16	-0.37	0.710				
	Supplier Integration	1.13	3.98	0.000				
	II * CI	-0.04	-0.33	0.741				
	CI * SI	0.00	0.02	0.983				
	II * SI	-0.11	-1.24	0.219				
II * CI * SI	0.01	0.77	0.445					

TABLE IV: Regression results for business performance.

Model	Independent Variable	Coefficients	t	p-value	R <sup>2</sup>	F	p-value	multiple R
1	Constant	0.90	3.13	0.002	0.55	141.18	0.000	
	Internal Integration	0.78	11.88	0.000				
	Constant	0.38	1.48	0.143	0.66	228.47	0.000	
	Customer Integration	0.89	15.12	0.000				
	Supplier Integration	0.21	0.81	0.418	0.69	259.55	0.000	
2	Constant	0.92	16.11	0.000				
	Internal Integration	-0.15	-0.64	0.526	0.75			0.87
	Customer Integration	0.12	1.46	0.147				
	Supplier Integration	0.38	3.92	0.000				
3	Constant	0.51	5.41	0.000				
	Internal Integration	0.19	0.74	0.462	0.69	127.54	0.000	0.83
	Customer Integration	0.28	3.10	0.002				
	Supplier Integration	0.66	7.21	0.000				
	Constant	0.86	1.57	0.120	0.69	86.33	0.000	0.83
	Internal Integration	0.07	0.42	0.672				
	Customer Integration	0.51	3.58	0.001				
4	II * CI	0.04	1.38	0.170				
	Constant	0.13	0.12	0.901	0.76	50.68	0.000	0.87
	Internal Integration	0.39	0.83	0.408				
	Customer Integration	0.49	1.05	0.294				
	Supplier Integration	0.19	0.62	0.536				
	II * CI	-0.12	-0.97	0.333				
	CI * SI	0.04	0.45	0.652				
II * SI	0.01	0.06	0.955					
II * CI * SI	0.01	0.50	0.617					

#### IV. DISCUSSION

This study explored the Supply Chain Integration dimensions—internal, customer, and supplier integration—and their respective impacts on SMEs' operational and business performance in Saudi Arabia, by meticulously analyzing data from 118 responding firms. The research aimed to validate and extend existing theories in the SCI domain, particularly in an emerging market context. The findings of this investigation offer nuanced insights into the SCI-

performance nexus, partially validating the proposed hypotheses and uncovering complex relationships that challenge and contribute to the prevailing SCI discourse.

This study finds a significant positive correlation between internal integration and both operational and business performance. This finding echoes the sentiments of previous studies [10], which underscore the pivotal role of internal integration in fostering a cohesive and efficient supply chain capable of driving performance. The context of Saudi SMEs accentuates the importance of internal integration; given the



specific business practices, regulatory environment, and market dynamics in Saudi Arabia, internal cohesion becomes a critical lever for navigating these complexities and achieving competitive advantage [11][12]. Supporting this assertion, Muheisen et al. [13] corroborate the vital role of internal integration in enhancing supply chain performance, especially in the context of evolving market dynamics and regulatory frameworks. These studies provide contemporary evidence that underscores the enduring significance of internal integration in driving operational and business success in the Saudi SME sector. This reiterates the foundational premise that effective supply chain management begins within the organization, underscoring Saudi SMEs' need to prioritize internal alignment and process optimization as a precursor to better external supply chain engagements. This emphasizes a strategic approach recognizing the importance of building a solid internal infrastructure before expanding external partnerships. It reflects a prudent strategy for Saudi SMEs to optimize their internal operations, streamline processes, and foster cohesion among internal stakeholders. They can thus enhance their readiness to effectively engage with external partners, thereby maximizing the benefits of SCI and driving sustainable growth and competitiveness in the Saudi market.

Investigating customer and supplier integration roles reveals a nuanced picture of their impacts on operational and business performance. Supplier integration is found to enhance operational performance, underscoring the strategic importance of supplier relationships in the operational realm, particularly for SMEs in Saudi Arabia, where supply chain efficiencies can be crucial for operational agility and responsiveness. Conversely, the relationship between customer integration and business performance highlights the strategic value of closely aligning with customer needs and expectations to drive business success. These findings suggest a dualistic approach to external integration, where the focus and intensity of integration efforts may need to be tailored according to the specific performance outcomes desired by Saudi SMEs. This underscores the strategic significance of carefully balancing supplier and customer integration efforts to optimize overall supply chain performance and achieve sustainable business growth in the Saudi market.

Contrary to expectations, the data did not support the anticipated moderating effects of customer and supplier integration on the relationship between internal integration and performance. This suggests that the direct contributions of SCI dimensions to performance may remain the same in their interactions, challenging conventional beliefs about the compound benefits of multi-dimensional SCI strategies [14][15]. This revelation prompts a rethinking of the SCI framework, especially in Saudi SMEs, where the direct impacts of integration dimensions appear more salient than their interactive effects. It signals a need for further research into the conditions under which these moderating effects may manifest, potentially exploring the influence of market characteristics, industry sectors, and firm capabilities. These findings prompt a reconsideration of traditional assumptions about the synergistic effects of multi-dimensional supply chain integration strategies. The unexpected lack of moderating

effects suggests the need for a more nuanced understanding, particularly in Saudi SMEs, calling for future research to delve deeper into the intricacies of SCI and its implications for performance outcomes, considering various contextual factors such as market dynamics and firm-specific capabilities.

The study's findings bear significant strategic implications for Saudi SMEs. The importance of internal integration as a performance enabler suggests that firms should adopt a phased approach to SCI, solidifying internal processes before embarking on external integration initiatives. The differential impacts of customer and supplier integration on business and operational performance offer strategic resource allocation and prioritization insights. Moreover, Saudi SMEs may benefit from a nuanced SCI strategy that considers the specific contributions of each integration dimension to desired performance outcomes, potentially leveraging supplier integration for operational excellence and customer integration for market competitiveness and business growth.

In conclusion, this research contributes to the nuanced understanding of SCI's impact on the performance of Saudi SMEs, highlighting the critical role of internal integration and the distinct contributions of external integration dimensions. The findings challenge the conventional wisdom of moderation effects in SCI, suggesting a more complex interplay of integration dimensions than previously thought. Future research can explore the rich avenue of the contextual factors that influence the effectiveness of SCI strategies, including industry-specific dynamics, cultural influences, and the regulatory landscape in Saudi Arabia and similar emerging markets. Further investigation into the mechanisms through which SCI dimensions interact and their differential impacts across various contexts will enrich the SCI discourse and provide valuable insights for practitioners and scholars alike.

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