The impact of collaboration on supply chain performance in the aerospace industry: Exploring the mediating role of knowledge sharing

Manal Ezekari | Imad Ait Lhassan | Rajaa Bazarouj | Ikrame Ouhnine

1. Introduction

The aerospace industrial sector is one of the key sectors playing a crucial role in Morocco's economy, contributing significantly to the country's GDP. The Moroccan aerospace sector achieved remarkable progress in 2023, marked by the signing of various investment agreements and conventions aimed at developing new high-value projects.

In 2023, the sector generated over 19.6 billion dirhams by the end of November, with projections to exceed 21 billion dirhams by the end of the year (Saidi, 2024). In terms of employment, the sector has created significant job opportunities, both direct and indirect. Currently, the sector employs more than 21,000 direct workers, a number expected to grow to keep pace with the sector's rapid expansion (Saidi, 2024).

The success of every industrial company relies on the implementation of effective managerial practices that enable them to achieve their strategic and operational objectives. Managerial practices play a crucial role in optimizing processes, improving efficiency, and enhancing market competitiveness.

The objective of this article is to study the impact of certain managerial practices on the performance of the supply chain in aerospace companies in Morocco. Specifically, we will examine practices such as collaboration and knowledge sharing.

To achieve this, we will begin with a literature review, analyzing previous empirical research that has explored these relationships in various industrial contexts. This analysis will help us understand the mechanisms through which managerial practices influence supply chain performance.

Next, we will aim to validate these relationships in the Moroccan context. This will involve collecting and analyzing data from Moroccan aerospace companies to determine if the conclusions of previous studies also apply to this specific sector in Morocco. Ultimately, our research aims to provide practical recommendations for Moroccan aerospace companies to improve their logistics performance and strengthen their competitiveness in the global market.

2. Literature review and development of hypotheses

2.1. Collaboration and Knowledge sharing

Collaboration within the supply chain is a key element for creating a competitive advantage. The challenges include cost reduction, quality improvement, focusing on core competencies, increasing revenues, and reducing lead times (Roy et al., 2006). It is a complex, multifaceted concept that is difficult to grasp due to its subjective nature and multiple meanings. Its defining aspects include the type of collaboration, the manner of implementation, and its degree.
Knowledge is pivotal for effective and efficient decision-making and is crucial for establishing a competitive edge by enhancing supply chain flexibility (Shih et al., 2012). The interactive process of knowledge sharing allows organizations to accumulate and develop new knowledge, enabling business partners to identify, understand, and address business issues. Effective knowledge sharing is a socio-technical issue, involving both the use of information technology for data exchange and coordination among various business partners. Therefore, Soosay et al. (2008) examine the collaboration capabilities of the supply chain for continuous innovation, highlighting how information sharing improves collaborative performance. Finally, we can say that collaboration is essential to accelerate knowledge sharing.

Hypothesis 1 (H1): Collaboration has a positive impact on Knowledge sharing.

2.2. Knowledge sharing and supply chain performance


Knowledge sharing enables companies to acquire and integrate internal and external resources, enhancing resource performance (Hitt et al., 2000). It fosters group knowledge accumulation, driving innovation and improving product and service quality (Jin & Li, 2012). As knowledge flows through sharing, it strengthens companies' learning capabilities and core competencies, promoting agile and flexible performance (Qin et al., 2011).

In today's knowledge-based economy, knowledge is a pivotal resource for maintaining a competitive edge (Yifei & Taoefi, 2010; Yurong & Mingwei, 2010). Its significance in supply chain management is crucial, as it is one of the three essential flows—alongside raw materials and financial capital—needed to enhance supply chain performance (Li et al., 2006; Zhou & Benton, 2007). Effective knowledge sharing among supply chain partners improves overall performance and competitive advantage (Huang & Lin, 2010; Yurong & Mingwei, 2010), facilitating informed decision-making, cost reduction, increased material flow, faster delivery, and improved order fulfillment rates.

Previous research consistently demonstrates a positive relationship between various forms of knowledge sharing and supply chain performance (Li & Hu, 2012; Barratt & Barratt, 2011). The Knowledge-Based View underscores the strategic importance of knowledge as a unique resource that, when strategically deployed, can yield distinctive performance outcomes (Grant, 1996). Sharing knowledge within and beyond organizational boundaries with supply chain partners is a potent strategy for enhancing supply chain performance.

Hypothesis 2 (H2): Knowledge sharing has a positive impact on supply chain performance.

2.3. Collaboration and supply chain performance

Numerous studies have underscored the significant impact of supply chain collaborations on the financial and non-financial performance of participating entities. Mentzer et al. (2000) and Frohlich & Westbrook (2001) have demonstrated that such collaborations can effectively enhance financial metrics like costs and revenues, as well as non-financial indicators such as customer service and marketability in the marketplace.

Moreover, Daanoune & Ait Lhassan (2018) conducted an empirical study employing semi-direct interviews to investigate the influence of collaboration on companies' performance in the northern region of Morocco. Their findings revealed unanimous agreement among interviewees, including Logistics Directors and Logistics Managers, regarding the positive impact of collaboration. They highlighted collaboration's pivotal role in mitigating risks that could disrupt production chains, reducing costs, and achieving organizational objectives.

Further reinforcing these findings, studies such as Kumar and van Dissel (1996) have delved into inter-firm collaborations, elucidating their correlation with both financial and non-financial performance metrics. Financial performance aspects encompass cost efficiency and returns on investment, while non-financial performance factors encompass a broad spectrum, including uncertainty reduction through vertical integration, access to complementary resources, and risk mitigation through co-investment with partners.

Hypothesis 3 (H3): Collaboration has a positive impact on supply chain performance.

2.4. Mediating Effect of Knowledge Sharing

The mediating role of knowledge sharing is crucial in the relationship between collaboration and supply chain performance. Collaborative activities require resources, patience, and numerous iterations (Ritala et al., 2015). Companies must regularly engage in these activities to optimize knowledge sharing and improve their performance. Although few studies have examined this point, knowledge sharing can serve as a mediator between collaborative activities and performance.

Knowledge sharing allows supply chain partners to acquire diverse information and perspectives (Cruz-González et al., 2015). These activities strengthen ties and mutual trust (Dodgson, 1993), facilitating access to various valuable knowledge.
resources within the network (Soosay et al., 2008). However, tacit knowledge is often difficult to disseminate (Grant, 1996). To fully exploit this tacit knowledge, companies must promote deep knowledge sharing to foster idea exchange (Cheung et al., 2016).

Through knowledge sharing, accumulated knowledge from close contacts and interactions (Dyer and Nobeoka, 2000) can spread throughout the supply chain networks and be transformed into a common language and memory shared by supply chain members (Myers and Cheung, 2008). This encourages members to use this knowledge collectively to develop new products (Sakakibara, 2003), improve efficiency, and achieve positive innovation outcomes. Additionally, they can better understand and respond to the market and competitive environment, enhancing coordination and supply chain performance (Malhotra et al., 2005).

Research has examined the mediating effect of knowledge sharing between collaboration and supply chain performance. For instance, Tsai (2001) explored how knowledge sharing between business units within an organization can enhance overall innovation performance. Lin (2007) highlighted the importance of knowledge sharing for the performance of collaborative work teams. Additionally, Sáenz et al. (2009) examined how knowledge sharing influences innovation outcomes in global supply chains. Gupta and Polonsky (2014) studied the dynamics of knowledge sharing in inter-organizational networks and its impact on operational performance.

To summarize, these studies confirm the importance of knowledge sharing as an essential mediating mechanism in the relationship between collaboration and performance, reinforcing the conclusions of Huang and Li (2009) on the crucial role of knowledge sharing in collaborative activities. Additionally, Cao and Zhang (2011) studied the impact of collaboration in the supply chain on collaborative advantage and performance, showing that information sharing plays a crucial role in these relationships.

Hypothesis 4 (H4): Collaboration has a positive impact on supply chain performance through the knowledge sharing as a mediating variable.

The figure 1 presents the conceptual research model, which encompasses three direct relationships and one indirect relationship among the studied research variables.

![Conceptual Model](image)

3. Materials and methods

3.1. Data collection and sample

In our study, we adopted a convenience sampling method, specifically targeting logistics directors and managers and contacting available companies within the industry. We also used the professional network LinkedIn to contact individuals working in the aeronautics companies covered by our study and sent them an online questionnaire to complete.

The initial sample for our research consisted of 320 Moroccan companies operating in the aeronautics sector. This sample size was obtained from professional directory websites in Morocco, such as Kerix. Data collection took place between January 2024 and March 2024 through a questionnaire distributed to the participants (logistics directors and managers). Of the total contacted entities, 130 out of 320 companies fully completed the questionnaire, resulting in a response rate of 40.63%.

3.2. Measuring variables

To measure the research model constructs, we employed measurement scales that have been previously validated in the literature. Collaboration, our first variable, was evaluated using six items adapted from Tan et al. (2002). Knowledge
sharing, the second variable, was gauged using a five-item scale derived from Van Den Hooff and De Ridder (2004). Supply chain performance, the third variable, was assessed using a six-item scale sourced from Bowersox et al. (2000). All items were rated on a 5-point Likert scale. All items were measured on a 5-point Likert scale. Table 1 illustrates the study variables along with their respective measurement items.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Numbers of Items</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration</td>
<td>6</td>
<td>Tan et al. (2002)</td>
</tr>
<tr>
<td>Knowledge Sharing</td>
<td>5</td>
<td>Van Den Hooff and De Ridder (2004)</td>
</tr>
<tr>
<td>Supply chain performance</td>
<td>6</td>
<td>Bowersox et al. (2000)</td>
</tr>
</tbody>
</table>

4. Results and discussion

The structural equation modeling (SEM) method serves as a robust tool for testing and validating our research model and hypotheses. For our analysis, we utilized the SMART PLS software, which is well-suited for complex SEM tasks. Validation of the research model adhered to established criteria, specifically focusing on four key indicators: Cronbach’s Alpha ≥ 0.7, Rho_A ≥ 0.7, Rho_C ≥ 0.7, and AVE ≥ 0.5.

Figure 2 illustrates our research model within the SMART PLS software, depicting four variables along with their respective items. During the initial analysis, we identified that one item, "SCP1" from the variable "supply chain performance," exhibited a loading index below 0.600. Consequently, we made the decision to remove this item from further analyses. Subsequent tests revealed that all remaining items demonstrated loading indices above 0.700, indicating strong construct validity and adherence to rigorous cross-loading standards.

Moreover, our examination of reliability indicators in Table 2 reaffirms the robustness of our findings. Each variable meets or exceeds the threshold values of Cronbach’s Alpha ≥ 0.7, Rho_A ≥ 0.7, Rho_C ≥ 0.7, and AVE ≥ 0.5, thereby confirming the reliability and consistency of our measurement model. This consistency extends to convergent validity, where the indicators for each construct align well with their respective theoretical frameworks.

Furthermore, we assessed discriminant validity using the Fornell and Larcker criterion, which highlights that the highest value observed is 0.915. This finding (Table 2) surpasses recommended thresholds and underscores the distinctiveness of each construct within our model, as advocated by specialists (Henseler et al., 2015).
As depicted in Table 3, discriminant validity is confirmed through the cross-loading criteria. This means that each indicator’s loading on its assigned construct is greater than its loadings on any other constructs, ensuring that the indicators are appropriately measuring their respective constructs without excessive overlap. It is noteworthy that all items exceed the threshold of 0.700, which aligns with scientific standards and indicates a strong level of indicator reliability and validity. This high level of loading signifies that the indicators have a strong correlation with their respective constructs, thus reinforcing the robustness of our measurement model. Moreover, these results support the notion that the constructs are distinct from one another, which is crucial for the validity of our structural model and the overall integrity of our research findings.

| Table 3 Discriminant validity according to cross-loading criteria. |
|-------------------------|-----------------|----------------|
|                         | CLB             | KS             | SCP            |
| Collab1                 | 0.779           | 0.573          | 0.504          |
| Collab2                 | 0.854           | 0.685          | 0.630          |
| Collab3                 | 0.830           | 0.580          | 0.504          |
| Collab4                 | 0.800           | 0.550          | 0.485          |
| Collab5                 | 0.836           | 0.699          | 0.584          |
| Collab6                 | 0.726           | 0.564          | 0.561          |
| Knw_Shar1               | 0.591           | 0.807          | 0.555          |
| Knw_Shar2               | 0.497           | 0.717          | 0.485          |
| Knw_Shar3               | 0.675           | 0.810          | 0.568          |
| Knw_Shar4               | 0.673           | 0.855          | 0.621          |
| Knw_Shar5               | 0.546           | 0.753          | 0.488          |
| SCP2                    | 0.677           | 0.692          | 0.922          |
| SCP3                    | 0.624           | 0.652          | 0.900          |
| SCP4                    | 0.596           | 0.585          | 0.926          |
| SCP5                    | 0.593           | 0.619          | 0.903          |
| SCP6                    | 0.616           | 0.606          | 0.922          |

The findings presented in Table 4 validate that the R\(^2\) values for the dependent variables KS and SCP are approximately 0.6, indicating a strong structural model (Joseph F. Hair et al., 2019). Furthermore, the results confirm that all Q\(^2\) index values exceed zero, demonstrating the constructs’ predictive relevance for the considered endogenous construct (Hair et al., 2011). Finally, the goodness-of-fit value is 0.596647, indicating a significant GoF (Henseler, Ringle, and Sinkovics, 2009).

| Table 4 F-square & Q-square. |
|-----------------------------|-----------------|----------------|
|                            | R Square         | Q Square       |
| Knowledge Sharing (KS)      | 0.579            | 0.350          |
| Supply Chain Performance (SCP) | 0.535          | 0.437          |

The results of hypothesis testing using SMART PLS with the bootstrapping method, detailed in Figure 3 and Table 5, reveal significant findings. Firstly, collaboration shows a positive impact on knowledge sharing (T= 13.679; p < 0.001) and also demonstrates a significant positive effect on supply chain performance (T= 2.466; p < 0.05). Additionally, knowledge sharing is found to positively influence supply chain performance (T= 3.112; p < 0.01).

Moreover, the indirect effects analyzed and presented in Table 6 indicate that knowledge sharing acts as a mediator in the relationship between collaboration and supply chain performance (T= 2.646; p < 0.01). These results underscore the critical role of collaboration in enhancing knowledge sharing within supply chains, thereby contributing positively to overall supply chain performance. The statistical analyses conducted through SMART PLS provide robust support for our research hypotheses and reinforce the theoretical framework guiding our study.

| Table 5 Path coefficients and significance tests (direct effect). |
|--------------------------|-----------------|-----------------|-----------------|-----------------|---------|
|                          | Original Sample | Sample Mean     | Standard Deviation | T Statistics   | P Values |
| CLB -> KS                | 0.761           | 0.766           | 0.056             | 13.679         | 0.000   |
| CLB -> SCP               | 0.367           | 0.351           | 0.149             | 2.466          | 0.014   |
| KS -> SCP                | 0.412           | 0.432           | 0.132             | 3.112          | 0.002   |

| Table 6 Path coefficients and significance tests (indirect effect). |
|--------------------------|-----------------|-----------------|-----------------|-----------------|---------|
|                          | Original Sample | Sample Mean     | Standard Deviation | T Statistics   | P Values |
| CLB -> KS -> SCP         | 0.314           | 0.335           | 0.119             | 2.646          | 0.008   |
The results of our study empirically confirm three key hypotheses in the context of companies specializing in the aerospace industry in Morocco. Firstly, we find that collaboration has a positive impact on knowledge sharing (H1), which is consistent with previous research by Roy et al. (2006) and Shih et al. (2012). Secondly, our results indicate that knowledge sharing has a beneficial effect on supply chain performance (H2), in line with the findings of Fawcett et al. (2007), Zhou and Benton (2007), Li and Lin (2006), Crook et al. (2008), and Petersen (1999). Finally, our analysis reveals that collaboration also positively impacts overall supply chain performance (H3), supported by prior research from Mentzer et al. (2000), Frohlich & Westbrook (2001), Daanoune & Ait Lhassan (2018), and Kumar and van Dissel (1996). These results underscore the crucial importance of collaboration and knowledge sharing in improving the performance of companies in this sector. Additionally, the results confirm the mediation of knowledge sharing between collaboration and supply chain performance (H4), conforming to the findings of previous empirical works such as Huang and Li (2009) and Lin (2007).

5. Conclusion

This study examines the influence of collaboration on the supply chain performance of Moroccan aerospace industry enterprises, particularly focusing on the mediating role of knowledge sharing.

This research makes a valuable contribution to the literature by examining, within a unique model, the impact of collaboration on the supply chain performance of Moroccan aerospace industry companies, with a focus on the mediating role of knowledge sharing. The measures used in this study have been validated in various international contexts. The results demonstrated positive and significant relationships among Moroccan aerospace industry companies.

The main limitation of our research is the small sample size. We attempted to contact several logistics directors and managers, but their unavailability resulted in a limited number of responses.

Regarding the future directions of our research, we plan to incorporate additional logistics chain practices into our research model to enrich it and assess whether there is mediation by knowledge sharing in supply chain performance. Additionally, we aim to test our research model in another sector such as the automotive or agricultural sector to provide a comparison within the Moroccan context.

Ethical considerations

The study correctly followed ethical policies towards questionnaire respondents. Also, we confirm the consent of all the respondents involved.

Conflict of Interest

The authors declare no conflicts of interest.

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References


