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# The Mediating Effect of Operational Capabilities: How the Construction Materials Industry in Indonesia Improves Its Operational Performance through Supply Chain Management

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**Abstract:** This study aims to analyze the influence of Collaborative Supply Chain Management (CSCM) and Supply Chain Adaptability (SCA) on the Operational Performance (OP) of the building materials industry in Indonesia. The research utilized online survey data to analyze 93 companies. The analysis of the data was conducted through PLS-SEM using the SmartPLS3 software. The results show that CSCM shows a positive but negligible impact on OP, while SCA does not have an effect on OP. However, the effect of CSCM and SCA on operational performance is significant and positive through a full mediation by operational capabilities. The conclusion emphasizes that external strategy success depends on strengthening internal resources, highlighting the importance of operational capability development as a core element for performance improvement.

**Keywords:** Collaborative Supply Chain Management, Building Materials Industry, Operational Capabilities, Operational Performance, Supply Chain Adaptability.

## INTRODUCTION

The construction materials industry is among the leading industries in the world, with a market size valued at 1.32 trillion dollars globally in 2023 (Fortune Business Insights, 2025). The industry excludes the installation and construction services, focusing instead on the production and supply of raw or processed materials that leads to usage in construction (Wang, 2014). However, it is a crucial industry that directly influences the construction industry, where its productivity and growth hinge on the performance of the construction materials industry (Moavenzadeh, 2022, pp. 73–109).

According to Liu et al. (2021), developed countries often have access to higher-quality and larger materials due to having the latest technology. However, developing countries instead suffer from a lack of production capacity and quality of the necessary construction materials due to having access to technology limited to older models with inferior performance (Pheng & Hou, 2019).

In Indonesia, the construction industry contributed to 10.43 percent of the GDP in the fourth quarter of 2024, making it the fourth biggest contributor of the GDP (Badan Pusat Statistik, 2025). It also indicates the significance of the construction materials industry based on how dependent the construction industry is towards it (Moavenzadeh, 1987/2022, pp. 73–109).

Unfortunately, the construction materials industry is experiencing a decrease with its performance, slowing down the growth if the industry. This issue stems from low technology adoption and stubbornness in utilizing traditional methods, which brings down the industry's efficiency (Pradoto et al., 2023). Furthermore, fragmentation of the industry further reduces its efficiency and delays projects, hindering its growth (Prayuda et al., 2021).

One example is the cement industry in Indonesia, the largest construction material produced in Indonesia, even ranking 5th globally in terms of production (China Research and Intelligence, 2024). In research conducted by Marzuqi and Abma (2024), using the SCOR model as a performance measurement of the industry, the results showed that issues can be seen in the material flow of the supply chain, with cases indicating material shortages and late deliveries despite producing large quantities of it.

Previously mentioned research by Ummah et al. (2023) suggested that coordination between departments or functions of the company will be one of the strategies manufacturing companies should take to improve operational performance. Research conducted by Eckstein et al. (2015), as cited by Morita et al. (2024), also shows a consequential affect between supply chain adaptability and operational performance, improving efficiency through demand-driven decisions (Ongkowijoyo et al., 2020)

Furthermore, Domenek et al., (2022), have also stated that operational capabilities serve as a great mediator between supply chain management and operational performance, encouraging further research of the model, though this research will also include supply chain adaptability as an extension. The researcher recommended that the research model be applied to other sectors in different countries. Due to no similar studies being done on the construction materials industry in Indonesia, there is an urgency for research to be conducted on operational performance in the industry.

This research paper aims to examine the relationship between Collaborative Supply Chain Management (CSCM), along with Supply Chain Adaptability (SCA), and the operational outcomes of companies across the construction materials industry. Mainly to determine whether CSCM and SCA have a significant impact on both the Operational Performance (OP) and Operational Capabilities (OC) of these companies. Furthermore, the study aims to explore how operational capabilities influence operational performance, and to investigate whether operational capabilities serve as a mediator between CSCM, along with SCA, and operational performance.

According to Bals and Rosca (2022, pp. 106–117), the resource-based view theory focuses on unique resources and capabilities utilized to achieve competitive advantage, influencing supply chain management and purchasing strategies, while also inspiring extensions like the Relational View and Dynamic Capabilities for enhanced performance.

According to Mohammed et al. (2024), CSCM is defined as a network of companies that make up a supply chain, working closely together with common goals to share information, streamline workflows, and plan actions to efficiently and effectively meet customer demands to keep a competitive advantage, such as cost, responsiveness, quality, and adaptation to changes in the market. CSCM consists of joint decision-making, sharing benefits for greater profitability, satisfying the demands of customers, while also including a collaborative culture across organizations, such as trust and information sharing (Mahadevan et al. 2022).

Operational Capabilities are defined as the firm's capabilities to make use of organizational resources to guide and finish tasks needed to carry out operational activities with

two perspectives which are the outcome perspective, where performance outcomes such as quality, cost and delivery is valued, along with the process approach where operational capabilities are defined as the ability to outperform their competitors in multiple performance dimensions (Khalaf and Mokadem, 2025).

According to Al Majali (2022), operational performance is defined as the ability to manage internal processes in an effective manner, such as reducing delivery time, inventory levels, and increasing the promotion quality of products, though it is also stated that operational performance does not include strategic performance measures and instead is on the level of daily operations executed by operators and other employees.

According to Morita et al. (2024), SCA refers to the company's capability to direct and enable supply chains to adjust their tactics, goods, procedures, and/or technology in response to market structural changes, making it easier for businesses to respond to changes in supply, demand, and the business environment.

According to Ali and Mahfouz (2025), SCA has a significant impact on operational capabilities, promoting improvements in organizational flexibility, process optimization, and the internal capabilities to respond to change by fostering awareness of threats and opportunities in its surrounding environment. Other findings also reinforce the idea by concluding that operational level flexibility and preparedness are critical outputs for adaptability which allows companies to reconstruct capabilities, achieve robust processes, and maintain competitiveness in a changing environment, pointing out the importance of SCA in maintaining operational capabilities (Kaneberg et al., 2025).

According to Yang et al. (2022) SCA provides a positive influence on OP when considering the ability to adapt across the supply chain, not just a company by itself, improving its flexibility, efficiency, and responsiveness. Phadnis (2023) further states that companies with higher adaptability have been empirically shown to outperform less adaptive companies in operational performance metrics such as response time, on-time delivery, short lead times, and high levels of customer service.

According to Prabhu et al. (2024), CSCM causes a significant and positive impact on the agility of the supply chain, which enables the company to adapt to the fluctuation of demands. This ability to effectively deal with processes is an integral part of a company's Operational Performance and fulfils two indicators found in it, which are the ability to fulfil orders without delays, and communicate efficiently with customers regarding deliveries to increase customer satisfaction.

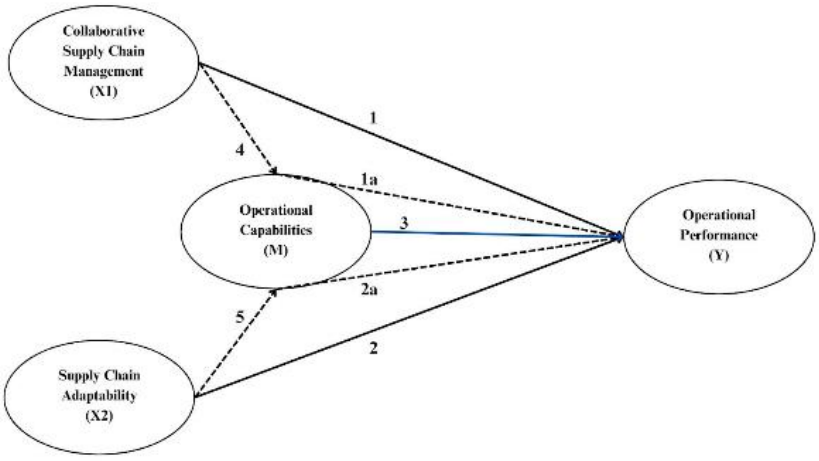
It can be implied that adaptation's relationship to Operational Performance is direct; however, the research conducted only showed a linear relationship of the variables, which does not disprove the relationship of CSCM to Operational Performance. Furthermore, the research also stated that the ability to adapt started due to the collaboration in the supply chain, affirming the direct link of the previously mentioned variables.

Based on Debgupta and Bhattacharyya (2024), in order for a company to ensure smooth operations and long-term success, there is a need for alignment between the company's goals and Supply Chain Management Strategy, including the collaborative strategy. Khalaf and Mokadem (2025) have defined Operational Capabilities as the firm's capabilities to make use of organizational resources to guide and finish tasks needed to carry out operational activities. In order to reach company goals, it is critical for operational activities to be carried out because they contribute greatly to the company's medium to long-term goals (Tang, 2024).

Domenek et al. (2022) stated that operational capabilities demonstrate how a company can achieve better overall performance. It has been proven that it can improve production efficiency and raise quality standards while also reducing costs for production, inventory, and delivery. Al Majali (2022) defined operational performance as the ability to manage internal processes effectively, relating to delivery time, inventory levels, and promotion quality of their

products. This shows that Operational Capabilities and Operational Performance themselves are heavily interlinked with one another, making Operational Capabilities a great variable to mediate.

Considering the formulation and earlier studies regarding CSCM, Operational Capabilities, and Operational Performance, the model of analysis in this study can be visualized as shown in Figure 1.




Source: Research Results

**Figure 1. Model of Analysis**

As such, the purpose of the research, and the theorization previously discussed, the hypothesis of this research are as follows:

H1 : Operational Performance is significantly affected by Collaborative Supply Chain Management.
H1a : Operational capabilities have a mediating effect between Operational Performance and Collaborative Supply Chain Management.
H2 : Supply Chain Adaptability significantly affects Operational Capabilities.
H2a : Operational Capabilities have a mediating effect between Supply Chain Adaptability and Operational Performance.
H3 : Operational Capabilities are significantly impacted by Collaborative Supply Chain Management.
H4 : Supply Chain Adaptability has a significant effect on Operational Capabilities.
H5 : Operational Capabilities have a significant effect on Operational Performance.

## METHODS

This research is quantitative research, which is a research method where the data are collected and expressed as numbers (Williams et al., 2021). The data will be collected through questionnaires and analyzed statistically using mediation analysis which is a part of multiple regression analysis. This is because the methods examine an independent variable's link to a dependent variable through a mediating variable, which aligns with the research model used. According to Sainani (2014), this research will be using the explanatory perspective, which aims to identify causal relationships between variables in a phenomenon, using numerical data and descriptive analysis to explain the relationships between the variables.

### Population and Sample

According to a book about research methods for business by Sekaran and Bougie (2016), population refers to the entire group of related people, events, or things the researcher aims to

hypothesize and understand. Meanwhile, a sample refers to one part of the population, which only includes some members selected instead of its entire population (Sekaran and Bougie, 2016). In this research, medium to large-sized Indonesian construction materials and equipment manufacturing companies will be used as the research population. These companies are selected due to their relevance toward the industry of the research topics.

This research will utilize the purposive sampling method with the judgement sampling type utilizing offline channels through physical paper, and online channels through google-form. Only specific profiles will be selected because the data can only be provided by profiles related to companies in Indonesia's construction materials industry. The sampling criteria of this research is that respondents are to be small to large-sized manufacturing companies based in Indonesia. If a company has 5-19 employees, it will be considered a small-sized company. if a company has 20-99 employees, it will be categorized as a medium-sized company. Meanwhile, companies with more than 99 employees can be classified as large companies (Badan Pusat Statistik Kota Surabaya, 2024). Because the number of companies in Indonesia are not clearly stated, the sampling will have an unknown population.

**Data Types, Sources and Measurement Scales**

A priori power analysis was conducted with the GPower 3.1 software to establish the required sample size for this study. The F-test family and the specific statistical test of Linear multiple regression: Fixed model, $R^2$ deviation from zero, were used in this research. The power of the test was changed to 0.80 with 5 predictors following the aforementioned model of analysis (Memon et al., 2020).

The resulting calculation yielded a required sample size of N=92, which is required to ensure the study possesses adequate statistical power to detect the hypothesized effect in the population.

The source of this data will be aacquired from primary data from distributed questionnaires targeted towards relevant profiles. The research will utilize the ordinal scale to analyze the answers from the respondents. This includes agreements to statements and relatability to competitors. This research uses a five-point likert scale for a more balanced range of response by allowing a neutral mid-point (Koo and Yang, 2025).

**Data Analysis Method**

The Partial Least Square Structural Equation Model (PLS-SEM) was used to analyze the collected data, which is advantageous in exploratory research and handling complex models, along with being flexible to samples with smaller sizes, making it ideal for this research that uses companies in a limited scope (Haji-Othman et al., 2024).

To verify the outer model, composite reliability was used to measure reliability, while validity will be assessed for convergent validity using outer loading and Average Variance Extracted (AVE). The inner model was assessed using the following indicators: path coefficients, Coefficient of Determination ($R^2$), and the Effect Size ($F^2$). Furthermore, the test will include hypothesis testing from bootstrapping, along with the mediation effect.

The current study utilizes a model comprising four key latent variables. The indicators used to measure CSCM were adapted from Cao and Zhang (2011, as cited in Li et al., 2023). The indicators for SCA were derived from Morita et al. (2024). The indicators for OC were adapted from Alves and Carvalho (2022). The indicators for OP were measured with instruments originally established by Deng and Noorliza (2023).

Because some of the indicators for Supply Chain Adaptability are directed towards producers in the supply chain, minor modifications are done in order to maintain validity in the context of the building materials industry which includes raw materials suppliers, distributors, and retailers.

Indicator SCA1 was adapted from 'Our production system is designed to accommodate changes in demand volume' to 'Our production/service system is designed to accommodate changes in demand volume'. SCA2 was adapted from 'Our production system is designed to accommodate changes in production/product mix' to 'Our production/service system is designed to accommodate changes in production/product mix'. SCA3 was adapted from 'Our firm has a good understanding of where our production technology stands, in terms of technology life cycles' to Our firm has a good understanding of where our technology stands, in terms of technology life cycles.

## RESULTS AND DISCUSSION

### Descriptive Statistics

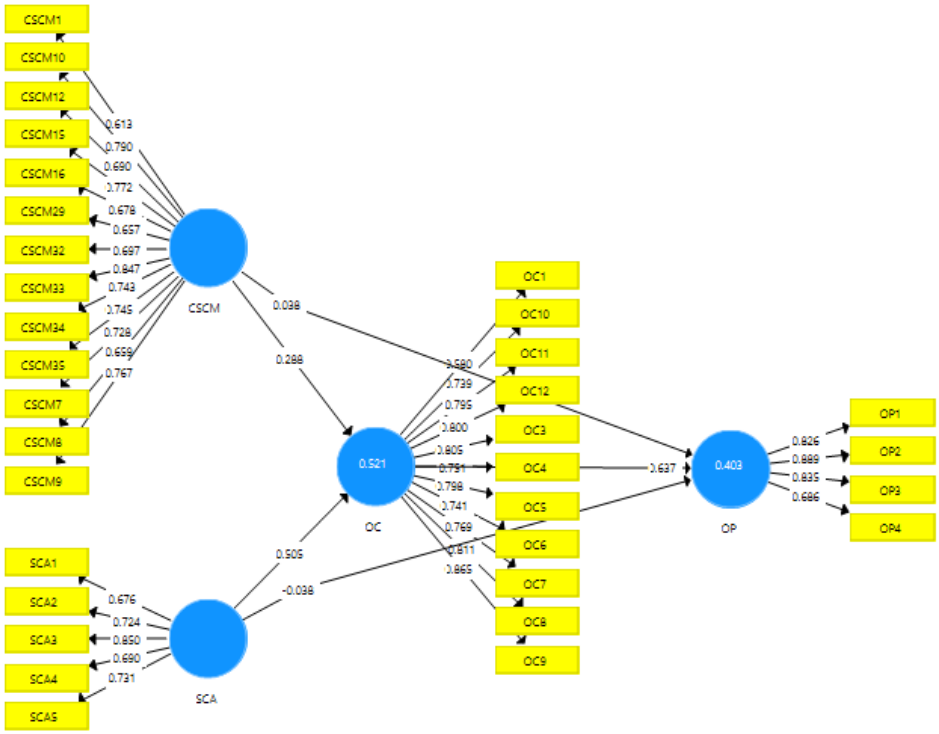
**Table 1. Respondents' Demographic Profile**

| Characteristics | Number of Respondents | % |
|---|---|---|
| **Age** | | |
| 18-26 | 27 | 28.7% |
| 27-35 | 25 | 26.9% |
| 36-45 | 24 | 25.8% |
| 46-55 | 14 | 15.1% |
| ≥56 | 3 | 3.2% |
| **Company Type** | | |
| Supplier | 7 | 7.5% |
| Manufacturer | 17 | 18.3% |
| Distributor | 29 | 31.2% |
| Retail | 35 | 37.6% |
| Other | 5 | 5.4% |
| **Gender** | | |
| Male | 63 | 67.7% |
| Female | 30 | 32.3% |
| **Role** | | |
| Owner | 35 | 37.6% |
| Director | 9 | 9.7% |
| Manager | 11 | 11.7% |
| Supervisor | 14 | 15.1% |
| Successor | 20 | 21.5% |
| Other | 4 | 4.3% |
| **Number of Employees** | | |
| ≤19 | 62 | 66% |
| 20-39 | 11 | 11.7% |
| 40-59 | 7 | 7.4% |
| 60-79 | 4 | 4.3% |
| 80-99 | 0 | 0% |
| ≥100 | 10 | 10.6% |
| **Industry (KBLI)** | | |
| 23922, 23929 | 3 | 3.2% |
| 23957 | 7 | 7.5% |
| 23959 | 11 | 11.8% |
| 16221, 16222 | 3 | 3.2% |
| 23961-23963 | 3 | 3.2% |
| 22210 | 15 | 16.1% |
| Other | **41** | 45% |

Source: Research Results

The resulting analysis of demography of the 93 respondents reveals a distribution across several key characteristics. The sample is predominantly male, representing 63 respondents (67.7%). The majority of respondents fall into the younger age brackets, with 27 respondents (28.7%) being 18-26 years old, and 25 respondents (26.9%) in the 27−35 age range. In terms of Company Type, the largest share of respondents is from the Retail sector, totaling35 respondents (37.6%). Most of the respondents' companies are small, as demonstrated by the Number of employees, with 62 companies (66%) consisting of less than 19 employees. Lastly, the sample's geographical distribution is concentrated in Surabaya, totaling 42 respondents (45.2%).

In this research, the PLS Structural Equation Model was used for two stages of measurement, which are the outer model (measurement model) and the inner model (structural model). Figure 2 shows the result of the path model of the analysis conducted using SmartPLS3. The model shows the path connecting the variables and their indicators.




Source: Research Results

**Figure 2. PLS Structural Model Result**

To assess the measurement model, a validity reliability test needs to be conducted, as seen in Table 2. Convergent validity is measured using outer loading and AVE with a validity of >0.55 and >0.5, respectively. In CSCM, all the indicators fulfill the criteria with an adequate AVE of 0.525. For OC, all indicators exceed 0.55 with a 0.595 AVE. OP meets the criteria with all of its indicators' values exceeding 0.55 and an AVE of 0.660. Lastly, SCA indicators are all valid with a valid AVE of 0.543. For reliability, the model is assessed using composite reliability with an accepted value of >0.7. All the variables show a composite reliability value exceeding 0.80, indicating good reliability

**Table 2. Convergent Validity and Reliability Test Results**

| Variable | Indicators | Outer Loading | AVE | Composite Reliability |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Collaborative Supply Chain Management | CSCM1 | 0.613 | 0.525 | 0.935 |
| | CSCM10 | 0.790 | | |
| | CSCM12 | 0.690 | | |
| | CSCM15 | 0.772 | | |
| | CSCM16 | 0.678 | | |
| | CSCM29 | 0.657 | | |
| | CSCM32 | 0.697 | | |
| | CSCM33 | 0.847 | | |
| | CSCM34 | 0.743 | | |
| | CSCM35 | 0.745 | | |
| | CSCM7 | 0.728 | | |
| | CSCM8 | 0.659 | | |
| | CSCM9 | 0.767 | | |
| Operational Capabilities | OC1 | 0.580 | 0.595 | 0.941 |
| | OC10 | 0.739 | | |
| | 0C11 | 0.795 | | |
| | OC12 | 0.800 | | |
| | OC3 | 0.805 | | |
| | OC4 | 0.751 | | |
| | OC5 | 0.798 | | |
| | OC6 | 0.741 | | |
| | OC7 | 0.769 | | |
| | OC8 | 0.811 | | |
| | OC9 | 0.865 | | |
| Operational Performance | OP1 | 0.826 | 0.660 | 0.885 |
| | OP2 | 0.889 | | |
| | OP3 | 0.835 | | |
| | OP4 | 0.686 | | |
| Supply Chain Adaptation | SCA1 | 0.676 | 0.543 | 0.855 |
| | SCA2 | 0.724 | | |
| | SCA3 | 0.850 | | |
| | SCA4 | 0.690 | | |
| | SCA5 | 0.731 | | |

Source: Research data

**Table 3. Discriminant Validity (Fornell-Lacker Criterion)**

| | **CSCM** | **OC** | **OP** | **SCA_** |
|---|---|---|---|---|
| Collaborative Supply Chain Management - **CSCM** | | | | |
| Operational Capabilities - **OC** | 0.725 | | | |
| Operational Performance - **OP** | 0.605 | 0.772 | | |
| Supply Chain Adaptability - **SCA** | 0.400 | 0.634 | 0.813 | |
| | 0.627 | 0.686 | 0.423 | 0.737 |

Source: Research data

**Table 4. Heterotrait-Monotrait Ratio (HTMT)**

| | **CSCM** | **OC** | **OP** | **SCA_** |
|---|---|---|---|---|
| Collaborative Supply Chain Management - **CSCM** | | | | |
| Operational Capabilities - **OC** | | | | |
| Operational Performance - **OP** | 0.632 | | | |
| Supply Chain Adaptability - **SCA** | 0.445 | 0.711 | 0.813 | |
| | 0.709 | 0.686 | 0.423 | 0.737 |

Source: Research data

The Fornell-Larcker Criterion and Heterotrait-Monotrait Ratio (HTMT) are used to measure discriminant validity. The criteria dictate that the AVE of a variable in the Fornell-Larcker Criterion should be bigger than the correlation it has with other variables, while the HTMT ratio requires the HTMT value between two constructs to be below the threshold of 0.85. As observed in Table 3, all the AVEs of each variable have a greater value than their respective column. In Table 4, all the HTMT values are observed to be below the threshold of 0.85, indicating that the measurement model meets the reliability and validity criteria.

The R2 value of each dependent construct evaluates the model's explanatory power, where higher values are considered better, with the value 1 being the best outcome. The impact of individual predictors on the dependent variable is assessed through f2, with 0.02, 0.15, and 0.35 as thresholds for small, medium, and large impact, respectively, while the Q2 value measures the model's predictive relevance. In Table 5, operational capabilities have a value of 0.521 while operational performance shows a value of 0.403.

**Table 5. R Square**

| | R-Square | R-Square Adjusted |
|---|---|---|
| OC | 0.521 | 0.511 |
| OP | 0.403 | 00.383 |

Source: Research data

Table 6 indicates that collaborative supply chain management has a small effect on operational capabilities at a value of 0.105, while supply chain adaptability has a large effect on operational capabilities at a value of 0.324. On the other hand, operational capabilities exhibit a large effect size on operational performance with a value of 0.325, while collaborative supply chain management and supply chain adaptability show a negligible effect size of 0.001.

**Table 6. F Square**

| | CSCM | OC | OP | SCA |
|---|---|---|---|---|
| CSCM | | 0.105 | 0.001 | |
| OC | | | 0.325 | |
| OP | | | | |
| SCA | | 0.324 | 0.001 | |

Source: Research data

Table 7 shows a Q2 value of 0.298 for operational capabilities and 0.231 for operational performance, which is a satisfactory result showing a moderate predictive relevance on both constructs.

**Table 7. Q Square**

| | SSO | SSE | $Q^2$ (=1-SSE/SSO) |
|---|---|---|---|
| CSCM | 1209 | 1209 | |
| OC | 1023 | 717.79 | 0.298 |
| OP | 372 | 286.154 | 0.231 |
| SCA | 465 | 465 | |

Source: Research data

The structural model assessed in Table 8 confirms the significance and nature of the conjectural relationships. Two direct paths and both indirect paths are shown to have achieved statistical significance. Collaborative supply chain management's effect on operational capabilities (H3) was significantly supported ($\beta = 0.288$; $t = 3.316$; $P<0.05$), along with the

strong relationship of operational capabilities to operational performance (H5: β = 0.637; t = 5.576; P<0.001). however, the hypotheses related to supply chain adaptability towards operational capabilities (H2: β = 0.505; P = 0.821) and the direct effect of supply chain adaptability on operational performance (H4: β = −0.038; P = 0.823) were not supported. Furthermore, the direct association between collaborative supply chain management and operational performance (H1: β = 0.038; t = 4.420; P<0.001) was supported; however, its effect size (f2 = 0.001 from previous analysis) suggests negligible relevance.

**Table 8. Hypothesis Testing**

| | Hypothesis | Path Coefficients | t-value | P-Values | Results | Mediation Effect |
|---|---|---|---|---|---|---|
| H3 | Collaborative Supply Chain Management → Operational Capabilities | 0.288 | 3.316 | 0.001 | Support | |
| H2 | Supply Chain Adaptability→ Operational Capabilities | 0.505 | 0.226 | 0.821 | Unsupported | |
| H1 | Collaborative Supply Chain Management → Operational Performance | 0.038 | 4.420 | 0.000 | Support | |
| H5 | Operational Capabilities → Operational Performance | 0.637 | 5.576 | 0.000 | Support | |
| H4 | Supply Chain Adaptability → Operational Performance | 0.038 | 0.224 | 0.823 | Unsupported | |
| H1a | Collaborative Supply Chain Management → Operational Capabilities→ Operational Performance | 0.184 | 3.124 | 0.002 | Support | Full Mediation |
| H2a | Supply Chain Adaptability → Operational Capabilities→ Operational Performance | 0.322 | 2.850 | 0.005 | Support | Full Mediation |

Source: Research data

The mediating role of operational capabilities was confirmed for both indirect paths. The analysis showed that operational capabilities fully mediate the influence of collaborative supply chain management on operational performance (H1a: β = 0.184; t = 3.124; P = 0.002), which suggests that OC is the only way that CSCM affects OP. Similarly, the relationship between supply chain adaptability and operational performance was shown to be fully mediated by operational capabilities (H2a: β = 0.322; t = 2.850; P = 0.005). This full mediation effect indicates that operational capabilities are an essential mechanism through which both collaborative practices and adaptive capabilities translate into improved performance.

Compared to previous studies (Siagian and Johono, 2022; Masa'deh et al., 2022), the findings show that while CSCM has a positive relationship with OP, its effect is negligible, differing greatly from the significant effect other studies show. This suggests that within the context of Indonesia's building materials industry, the effect of collaborative practices is entirely reliant upon the success of operational capabilities. For these firms, the direct collaborative benefit does not exist outside of their ability to drive internal, core competence. The lack of a significant direct relationship of SCA to OC and OP shows a sharp contrast to earlier research conducted by Eckstein et al. (2015) and Siagian et al. (2021). This suggests a critical contextual factor, that in the context of Indonesia's building materials industry, the resource investments required for strategic adaptation may be highly fragmented, inefficient,

or too costly for immediate, measurable gains, therefore relying on strong internal operational capabilities before performance is achieved.

The full mediation for both relationships aligns strongly with the intersection of the Resource-Based View (RBV) Theory. This outcome suggests that external efforts or resources are insufficient. True competitive advantage is rooted in the internal mechanisms that successfully process, integrate, and operationalize those external factors. The full mediation confirms that operational capabilities are not just an arbitrary link, but the necessary, endogenous mechanism for transforming external strategies into performance outcomes, coinciding with previous studies (Kim et al., 2020; Zhang et al., 2025; Domenek et al., 2022).

RBV suggests companies engage in CSCM to reduce dependence and secure crucial external resources. The value of that collaboration is not realized until the firm can effectively integrate the acquired external resource into its own operational system. For instance, information sharing must be used to redesign manufacturing processes or optimize inventoryn management before it shows tangible results like reduced operating costs.

The negligible effect of CSCM and lack of effect of SCA towards OC and OP can be attributed to the majority of the sample coming from small to medium companies, where resources are limited compared to large companies. The lack of resources causes these companies to have less adaptability in facing changes due to informal strategies, while effective collaboration requires investments in shared systems or human resources dedicated to collaboration efforts, which SMEs don't have abundant access to. It is from this perspective that performance cannot be enhanced by flexible external strategies alone, but instead through operational capabilities enhanced by it.

The most critical practical finding for managers is the definitive role of Operational Capabilities as the primary performance driver. The finding of full mediation through operational capabilities indicates that simply launching supply chain initiatives will not suffice. Managers must prioritize operational capabilities to achieve good operational performance through CSCM and SCA.

The findings show that in order to achieve good CSCM, companies must shift to joint learning by searching and acquiring new and relevant knowledge, along with jointly establishing collaboration plans to achieve their goals. Managers may implement joint research or projects with partners to discover information and innovations that can be integrated into the supply chain, along with creating synchronized schedules and planning processes to minimize deviations and sudden adjustments, thus increasing operational efficiency. For supply chain adaptability, companies must understand their current technological capacity in its lifecycle, and have external awareness of its surrounding environment. Managers can achieve this through regular analysis of strategies of competitors outside of their immediate market, such as the global market, and conducting periodic audits to assess the readiness and efficiency of the technologies used in the company.

In order to achieve good CSCM and SCA, managers need to focus on OC, mainly cost control and financial management capabilities in their companies. A good cost control is indicated by a low Cost-Of-Goods-Sold (COGS) without compromising quality, such as material waste reduction in manufacturing, and a good ratio of total expenses to total revenue. Optimizing the time required to turn investments and other resources into cash from sales (working capital cycle) can enhance financial management capabilities, leading to smoother cash flows and a high inventory turnover rate, which reduces administrative burdens and resource usage, making way for other capabilities.

Lastly, Managers must guarantee on-time deliveries, fulfilled customer requirements, and customer troubleshooting capabilities from the previous indicators found in CSCM, SCA, and OC, in order to realize improvements in operational performance .

## CONCLUSION

This study aimed to examine the direct and indirect influence of CSCM and SCA on OP, mediated by OC, specifically within Indonesia's building materials industry. The analysis successfully validated the measurement model and provided strong support for the central role of operational capabilities. The primary theoretical conclusion is the confirmation of Full Mediation across all structural paths. This decisive finding aligns with the Resource Dependence Theory, demonstrating that external supply chain initiatives are not direct drivers of performance, but rather function entirely as antecedents to capability development. The effect of collaboration or adaptation is completely channeled through the firm's capacity to internalize, integrate, and operationalize those external resources. This outcome is further highlighted by the finding that the direct effects of SCA are practically negligible, contradicting numerous studies and validating the uniqueness of the Indonesian context, where a robust internal capability mechanism is the sole guarantor of competitive performance.

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