Effect of information quality on supply chain performance through information sharing: Evidence from construction industry in Indonesia

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Abstract

The construction industry is an economic sector that requires strong collaboration between various parties in the supply chain. This study aims to analyze the effect of information quality on supply chain performance through information sharing in the construction industry. This study uses a quantitative approach by collecting data through surveys of developers, consultants, contractors and suppliers involved in the process of building office and apartment buildings in Jakarta. The collected data was analyzed by using Structural Equation Modeling – Partial Least Squares (SEM-PLS 4.0). Out of 100 respondents, 22% were developers, 19% were consultants, 35% were contractors, and 24% were suppliers. The findings show that there is a positive effect of information quality on information sharing. In addition, information sharing practices are also proven to mediate the effect of information quality on supply chain performance. These findings emphasize the importance of information quality in improving supply chain performance through information sharing. These findings can also contribute to the literature on supply chain management, with a particular focus on the construction industry context. The practical implication of this research is that with quality information quality and effective information sharing, companies can carry out better planning and scheduling, reduce uncertainty, and increase operational efficiency.

***Keywords*:** Information Quality; Information Sharing; Supply Chain Performance; Construction Industry; Indonesia

1. Introduction

Barrett Jamie (2023) found that the supply chain is the real glue that holds projects together, and delays in the chain can have a detrimental impact on the entire project. Saluy & Madelan (2023), in their research found that although contractors apply overtime to speed up work or make up for lost time in order to complete certain projects on time, this ultimately reduces labor productivity and increases labor costs through higher wages. According to research by FMI (Future Market Insight) Consultants, 89% of respondents experienced project delays in 2022, with 44% of these delays related to the supply chain (Cavalier et al., 2022). This indicates that the supply chain has a significant influence on project delays, which in turn result in increased construction costs.

Chopra & Meindl (2013), in their book entitled Supply Chain management, reveal that supply chains are dynamic and involve a constant flow of information, products and money between different stages. Thus, information flow plays an important role in supply chain performance. Thus, the flow of information plays an important role in supply chain performance. Research conducted by Ramadhan et al. (2023) found that the flow of information has a positive influence on supply chain performance in construction projects, where communication misses can risk causing construction delays. According to Demiris et al. (2008), information flow involves access, exchange, and documentation of information, which can be characterized as information sharing with partners. According to Purnomo & Sulistyowati (2018), integration is not only in work systems but also includes human resource collaboration, communication and information sharing with quality data. In the opinion of Imaroh & Widiyani (2023), information sharing is a way for supply chain members to obtain, maintain and convey the information needed to ensure effective decision making, and is a factor that can strengthen the overall collaboration element. Therefore, the quality of information received and exchanged between various parties in the supply chain is key to overcoming these challenges. Habtemariyam et al., (2022) found that any supply chain improvements such as strategic supplier partnerships, customer relationships, and internal lean practices, the level of information sharing, and the quality of information can increase competitiveness from the company.

Bani Hani (2022) found a significant and positive relationship between information quality and supply chain performance, indicating that information quality plays an important role in optimizing supply chain performance and reducing construction project delays. Feredrikson & Jeny (2020) found that information sharing between main contractors in supply chain management aims to coordinate the construction process between supply chain actors, thereby impacting supply chain performance. Setyawan Firmansyah & Siagian (2022) found that information sharing can improve supply chain performance, as did Alhamda & Wahyuningsih (2023). However, research by Ahmed (2022) and Nurjanah et al. (2023) found that information sharing did not improve supply chain performance, indicating a research gap. Kankam et al. (2023) and Marinagi (2015) found that information sharing had a mediating impact between information quality and supply chain performance in the manufacturing sector. Therefore, information sharing in the construction supply chain is also crucial for improving supply chain performance.

This suggests that good integration and collaboration can support supply chain performance, thereby increasing competitive advantage. However, the manufacturing industry differs from the construction industry, so the application of supply chain performance, information quality, and information sharing in the construction industry requires a different approach that reflects the objectives of supply chain management. This research aims to explore the influence of information quality and the effectiveness of information sharing in the construction industry. The relationship between these three concepts in the construction industry has not yet been widely researched empirically.

2. Theory and Hypothesis Development

Supply chains are dynamic systems characterized by a continuous flow of information, products, and capital across various stages. Accurate and high-quality information sharing is essential at every phase of the supply chain (Chopra & Meindl, 2013). According to Liao (2019), the construction industry's supply chain revolves around the General Contractor, who integrates material suppliers, mechanical equipment suppliers, designers, subcontractors, consultants, and owners into a cohesive network through the flow of information, materials, and capital.

2.1 Information Quality and Supply Chain Performance

Gustavsson & Wanstrom (2009) found that information quality is the ability to satisfy both the stated and implied needs of information recipients. This refers to the extent to which information is considered good or of high quality in a particular context. Quality information is the most useful because it helps stakeholders understand what is important to them and provides the most valuable data for their business decisions. Research by Kempa & Jovial (2019) in the goods trade industry sector (supplier/distributor), as well as studies by Kankam et al. (2023), Wang & Chi (2021), Kanan (2023), Trisha Nag (2021), and Bani Hani (2022) in the manufacturing industry, found a significant and positive influence of information quality on supply chain performance. Hypothesis 1: Information quality influences supply chain *performance.*

2.2 Information Quality and Information Sharing

Marinagi et al. (2015) demonstrated that information quality has a statistically significant positive direct impact on information sharing, which supports supply chain performance. Kankam et al. (2023) found that information sharing increases with improved information quality. According to Gebisa (2021), information sharing delivered with the right quality and quantity, content, and other types of quality information, leads to better performance by reducing operating costs and increasing company responsiveness. Hypothesis 2: Information quality influences information sharing.

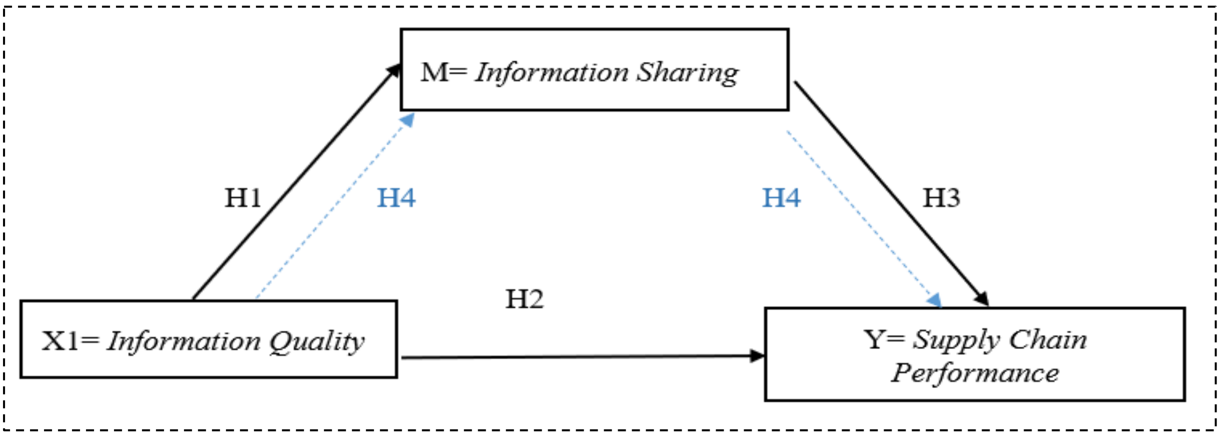
2.3 Information Sharing and Supply Chain Performance

Studies by Maskey et al. (2022), Ayele & Ram (2020), and Setyawan Firmansyah & Siagian (2022) in the goods trade sector (supplier/distributor), as well as research by Kabelele & Musabila (2020) and Wang & Chi (2021) in the manufacturing industry, have shown a significant and positive influence of information sharing on supply chain performance. Hypothesis 3: Information sharing influences supply chain performance.

2.4 Information Quality, information sharing and Supply Chain Performance

According to Marinagi et al. (2015), information quality has been proven to have a statistically significant positive direct impact on information sharing in order to support Supply Chain Performance." Similarly, Kankam et al. (2023) assert that supplier-buyer relationships are greatly influenced by information sharing and information quality in the supply chain. Therefore, information sharing and information quality influence supply chain performance because quality and well-shared information allows the supply chain to operate more efficiently, adaptively, and responsively to changes in the business environment. There is a causal relationship between these three concepts, where increasing information sharing, and information quality tends to lead to an improvement in overall supply chain performance. Hypothesis 4: Information quality influences supply chain performance through information sharing.

Figure 1. Conceptual Framework of the Study



3. Methodology

Based on the background and problem formulation previously mentioned, this research employs a quantitative approach to measure the influence of information quality on supply chain performance through information sharing.

3.1 Research Design

The data collection method uses non-probability sampling, specifically purposive sampling. Research hypothesis testing was carried out using a Structural Equation Model (SEM) approach based on Partial Least Squares (PLS). According to Hair et al. (2019), SEM PLS is a multivariate statistical method for testing a series of causal relationships or influences between variables, calculated simultaneously to make predictions, explore, or develop structural models. Yamin (2022) states that evaluation using SEM PLS includes three aspects: evaluation of the measurement model (outer model), evaluation of the structural model (inner model), and evaluation of model suitability or goodness of fit. The research model used in this study is a first-order model, where each variable is directly measured with its indicators. This measurement model is reflective, with information quality, information sharing, and supply chain performance measured reflectively.

3.2 Respondents

In this study, 105 questionnaires were distributed, and 103 were returned. After validation, the number of usable responses was 100. The population in this study consists of workers involved in the construction of commercial and apartment buildings in South Jakarta. The sample for the questionnaire included Developers, Consultants, Contractors, Subcontractors, Suppliers, and Distributors at the Project Manager-Supervisor level.

Table 3.1 Respondent Profile

NO	Group	f	%
1	Developers	22	22%
2	Consultants	19	19%
3	Contractors	35	35%
4	Distributor/Supplier	24	24%
Total		**100**	**100%**

Source: based on 2024 questionnaire results

Table 3.1 shows the respondent profile, indicating that the majority of respondents are employees working in contractor companies, with 35 respondents. This is followed by employees working in supplier or distributor companies, with 24 respondents. Additionally, 22 respondents are employees working as developers or owners, and the remaining 19 respondents are employees working as consultants.

3.3 Variable Operationalization

Table 3.2 Operationalization Information Quality Variable

Variable	Indicators	Code
Information	Precise and accurate according to conditions in the field	IQ1

Quality (IQ)	Relevant or in accordance with the scope of work	IQ2
	The extent to which the information is still up to date	IQ3
	Compact can be used directly	IQ4
	Easy to understand by the recipient of the information	IQ5
	Easy to access when needed	IQ6

Source: Kankam et al., (2023); Gustavsson and Wänström (2009)

Table 3.3 Operationalization Information Sharing Variable

Variable	Indicators	Code
Information Sharing (IS)	Provide relevant and accurate answers	IS1
	Ability to respond quickly to questions.	IS2

Source: Kankam et al., (2023)

Table 3.3 Operationalization Supply Chain Performance Variable

Variable	Indicators	Code
Supply Chain Performance (SCP)	Can fulfill orders according to specifications and schedules	SCP1
	Time required to order until materials are received	SCP2
	Reliability of response to changes in demand	SCP3
	Reliability of return on project investment	SCP4
	Customer satisfaction with the quality of services provided	SCP5
	Updated activity and job timelines	SCP6
	Ability to minimize job changes in the field/rework	SCP7
	Ability to manage materials in the warehouse	SCP8

Source: Thunberg, (2016); Vrijhoef & Koskela, (1998)

4. Result

4.1 Convergent Validity Test

Convergent validity relates to the principle that the measures of a construct should be highly correlated (Ghozali, 2021). The criteria used are outer factor loading and Average Variance Extracted (AVE). According to Hair et al. (2021), the loading factor value must be greater than 0.70 to establish validity, and the minimum AVE value should be 0.50. Table 4.1 indicates that the outer loading values for each indicator are greater than 0.70, ranging from 0.724 to 0.924. Table 4.2 shows that the AVE values are greater than 0.50, ranging from 0.616 to 0.902. Thus, all indicators satisfy the requirements for convergent validity.

Table 4.1 Outer Loading Result

Variable	Items	*Outer Loadings*	Result
Information Quality (IQ)	IQ1	0.818	Valid
	IQ2	0.785	Valid
	IQ3	0.783	Valid
	IQ4	0.724	Valid
	IQ5	0.806	Valid
	IQ6	0.792	Valid
Information Sharing (IS)	IS1	0.950	Valid
	IS2	0.950	Valid
Supply Chain Performance (SCP)	SCP1	0.926	Valid
	SCP2	0.900	Valid
	SCP3	0.883	Valid
	SCP4	0.849	Valid
	SCP5	0.923	Valid
	SCP6	0.914	Valid
	SCP7	0.847	Valid
	SCP8	0.823	Valid

Table 4.2 Average Variance Extracted Result

Variable	Average Variance Extracted (AVE)	Result
Information Quality (IQ)	0.616	Valid
Information Sharing (IS)	0.902	Valid
Supply Chain Performance (SCP	0.781	Valid

4.2 Discriminant Validity Test

According to Hair et al. (2021), discriminant validity evaluates the extent to which a construct differs from other constructs. The criteria used include the Fornell-Larcker Criterion, HTMT (Heterotrait-Monotrait Ratio), and Cross Loading Factor. A variable has good discriminant validity if the square root of the AVE (Average Variance Extracted) is greater than the correlation between the variables. Table 4.3 shows that the Fornell-Larcker Criterion results indicate that the square root of the AVE is greater than the correlation between the variables, thus meeting the requirement. Hair et al. (2021) also recommended that the HTMT value should be less than 0.90. Table 4.4 shows that the HTMT values are all less than 0.90, thus meeting this requirement as well.

Table 4.3 Fornell-Larcker Criterion Result

Fornell-Larcker Criterion	Information Quality	Information Sharing	Supply Chain Performance
Information Quality	**0.785**		
Information Sharing	0.778	**0.950**	
Supply Chain Performance	0.755	0.776	**0.884**

Table 4.4 Heterotrait-Monotrait ratio (HTMT) Result

HTMT	Result
Information Sharing←→Information Quality	0.867
Supply Chain Performance ←→ Information Quality	0.804
Supply Chain Performance ←→ Information Sharing	0.838

4.3 Reliability Test

Composite Reliability describes the level of reliability or internal consistency of a construct. According to Hair et al. (2021), a composite reliability and Cronbach's alpha value greater than 0.70 is recommended for a variable to be considered reliable. Table 4.5 shows that all constructs have composite reliability values and Cronbach's alpha values greater than 0.70. Therefore, it can be concluded that the constructs exhibit good reliability.

Table 4.5 Composite Reliability and Cronbach's Alpha Result

Variable	Cronbach's Alpha	Composite Reliability	Result
Information Quality	0.876	0.906	Reliable
Information Sharing	0.892	0.949	Reliable
Supply Chain Performance	0.960	0.966	Reliable

4.4 Multicollinearity Test

The aim is to determine whether the regression model reveals any correlation between independent variables. If a correlation is present, it is referred to as a multicollinearity problem. Multicollinearity testing between variables is conducted using the inner VIF (Variance Inflation Factor). If the inner VIF is less than 5, it indicates that multicollinearity is low or negligible. Table 4.6 shows collinearity statistics that are all smaller than 5, indicating that multicollinearity is low and can be ignored.

Table 4.6 Collinearity statistics Result

Variable	VIF
Information Quality → Information Sharing	1.000
Information Quality → Supply Chain Performance	2.537
Information Sharing → Supply Chain Performance	2.537

4.5 Goodness of Fit Test

The model's acceptance is determined through a model suitability evaluation test, which considers R Square, Q Square, Gof Index and SRMR. According to Hair et al., (2019) the R-square value is divided into 3 categories, namely, 0.75 (high), 0.50 (medium), 0.25 (low). Table 4.7 shows that the influence of information quality on information sharing is 60.6%, classified as medium, while the influence of information quality on supply chain performance is 66%, classified as medium.

Table 4.7 R Square and Q Square Result

Variable	R Square	Q Square
Information Sharing	0.606	0.582
Supply Chain Performance	0.660	0.557

According to Hair et al. (2019), Q Square qualitative interpretation values are: Low influence (0), moderate influence (0.25), and high influence (0.50). Table 4.7 indicates that the Q Square value for information sharing is 0.582 (> 0.5, indicating high prediction accuracy), and for supply chain performance, it is 0.557 (> 0.5, also indicating high prediction accuracy).

Table 4.8 SRMR (Standardized Root Mean Square Residual) Result

SRMR (Standardized Root Mean Square Residual)	0.094

According to Karin Scmelleh et al (2003), SRMR values between 0.08 – 0.10 indicate that the model is acceptable (acceptable fit). Based on table 4.8 SRMR value, it is found that the SRMR value is 0.094 < 0.10, this means the model is acceptable.

Table 4.9 Goodness of Fit Index (GoF Index) Result

Average Communality	Average R Square	GoF Index
0.73	0.633	**0.68**

According to Wetzels et al. (2009), the standard values for the Goodness of Fit (GoF) index are as follows: Low GoF (0.1), Medium GoF (0.25), and High GoF (0.36). Table 4.9 shows a GoF index value of 0.68, categorizing it within the high GoF range.

4.6 Hypothesis Test Result

Hypothesis testing is used to determine whether there is a direct or indirect influence of exogenous variables on endogenous variables. The test criteria indicate a positive and significant influence if the p-value is ≤ the level of significance (alpha = 0.05). Based on the tests conducted, the following results were obtained.

Figure 2. Hypothesis Testing Results - Bootstrapping Smart-Pls 4.0

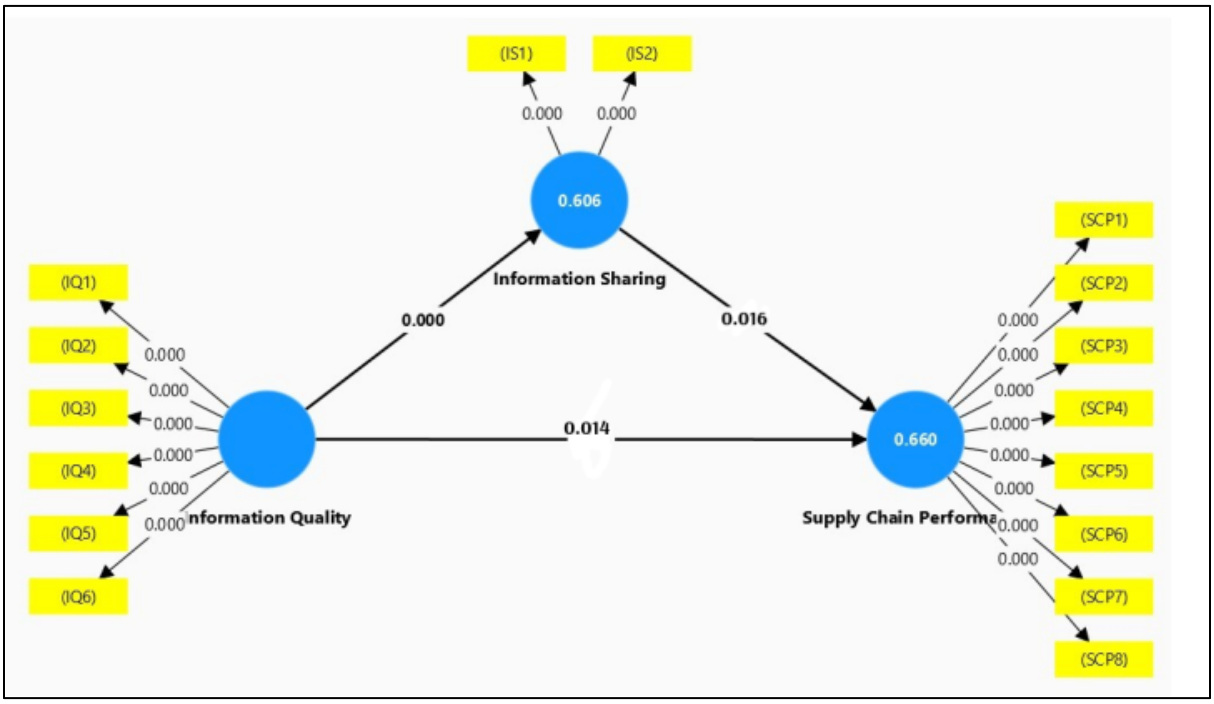


Table 4.9 Hypothesis Result – Direct Effect

Hypothesis	Path Coefficient	p-value	95% Confidence Interval		f square
			Below	Above	
H1. IQ → SCP	0.382	0.014	0.047	0.706	0.169
H2. IQ → IS	0.778	0.000	0.702	0.866	1.537
H3. IS → SCP	0.479	0.016	0.068	0.843	0.266
H4. IQ → IS → SCP	0.373	0.035	0,043	0,679	0.142

Result of Bootstrapping SEM-PLS 4, 2024; IQ = Information Quality; IS = Information Sharing; SCP = Supply Chain Performance

Based on Table 4.9 Evaluation of Hypothesis Testing - Direct Effect, it is known that:

H1. The Influence of Information Quality on Supply Chain Performance.

Hypothesis 1 is accepted, indicating that information quality (IQ) has a positive and significant influence on supply chain performance (SCP), with a path coefficient of 0.382 and a p-value of 0.030 ($p < 0.05$). Within the 95% confidence interval, the impact of information quality on improving supply chain performance ranges from 0.047 to 0.706, showing a moderate effect at the structural level ($f^2 = 0.266$). This implies that better information quality leads to better supply chain performance in the construction industry. These findings are consistent with previous research by Kempa & Jovial (2019) in the goods trading sector (supplier/distributor) and studies by Kankam et al. (2023), Wang & Chi (2021), Kanan (2023), Trisha Nag (2021), and Bani Hani (2022) in the manufacturing industry.

H2. The Influence of Information Quality on Information Sharing.

Hypothesis 2 is accepted, indicating that information quality (IQ) has a positive and significant influence on information sharing (IS), with a path coefficient of 0.778 and a p-value of 0.000 ($p < 0.05$). Within the 95% confidence interval, the impact of information quality on enhancing information sharing ranges from 0.702 to 0.866, showing a strong effect at the structural level ($f^2 = 1.537$). The research results demonstrate that information quality (IQ) has a statistically significant positive direct impact on information sharing (IS) in the construction industry. This finding is consistent with the research of Kankam et al. (2023) and Marinagi et al. (2015) in the manufacturing industry.

H3. The Effect of Information Sharing on Supply Chain Performance.

Hypothesis 3 is accepted, indicating that information sharing (IS) has a positive and significant influence on supply chain performance (SCP), with a path coefficient of 0.479 and a p-value of 0.016 ($p < 0.05$). Within the 95% confidence interval, the impact of information sharing on improving supply chain performance ranges from 0.068 to 0.843, showing a moderate effect at the structural level ($f^2 = 0.169$). The research results demonstrate that information sharing (IS) has a statistically significant positive direct impact on supply chain performance (SCP). This finding aligns with previous studies, including those by Gebisa (2023), Maskey et al. (2022), Ayele & Ram (2020), and Setyawan Firmansyah & Siagian (2022) in the field of goods trade (supplier/distributor), as well as research by Kabelele & Musabila (2020) and Wang & Chi (2021) in the manufacturing industry.

Table 4.10 Hypothesis Result - Indirect Effect

Hypothesis	**Path Coefficient**	**p-value**	**95% Confidence Interval**		**f-square (Upsilon v)**
			Below	**Above**	
H4. IQ → IS → SCP	0.375	0.035	0,043	0,679	0.142

Result of Bootstrapping SEM-PLS 4, 2024; IQ = Information Quality; IS = Information Sharing; SCP = Supply Chain Performance

Based on Table 4.10 Hypothesis Result – Indirect Effect, it is known that:

H4. The Influence of Information Quality on Supply Chain Performance through Information Sharing.

Hypothesis 4 is accepted, indicating that information quality (IQ) positively and significantly influences supply chain performance (SCP) through information sharing (IS), with a path coefficient of 0.375 and a p-value of 0.035 ($p < 0.05$). Within the 95% confidence interval, the impact of information sharing (IS) on enhancing supply chain performance (SCP) ranges from 0.043 to 0.679 and exhibits a moderate effect at the structural level ($f^2 = 0.142$). This significant relationship between information quality (IQ) and supply chain performance (SCP) via information sharing (IS) aligns with the findings of Kankam et al. (2023) in the manufacturing industry.

The influence of information quality on supply chain performance through information sharing in the construction industry is a complex but very important relationship. Effective information sharing is very dependent on the quality of information shared, and in turn, good information sharing can improve supply chain performance significantly. Accurate, complete, relevant and timely information enables more effective information sharing along the supply chain. When all parties have access to high-quality information, communication is clearer, and all stakeholders can work with a common understanding of project status, needs, and potential issues.

4.7 Mediation Effect Test

Table 4.11 Mediation Effect Result

Effect	Variable	Original sample (O)
Indirect Effect	SCP → IS → SCP	0.375
Direct Effect	IQ → SCP	0.382

VAF = Indirect Effect/Total Effect = 0.375/ (0.375+0.382) = 0.494

According to Hair (2014), there are three types of mediation effects based on the Variance Accounted For (VAF) value: full mediation (VAF > 80%), partial mediation (20% ≤ VAF ≤ 80%), and no mediation (VAF < 20%). Based on the calculations in Table 4.11, the VAF value is 0.495 (49.5%), indicating partial mediation.

5. Conclusion

The results indicate that high-quality information positively impacts supply chain performance. Accurate, timely, and relevant information enhances decision-making processes, reduces uncertainties, and improves coordination among supply chain partners. This direct relationship underscores the importance of maintaining high standards of information quality within the construction industry. Information sharing was found to play a significant mediating role in the relationship between information quality and supply chain performance. The study highlights that the positive effects of information quality on supply chain performance are amplified when information is shared effectively.

In the construction industry, where projects are complex and involve multiple stakeholders, efficient information sharing can streamline processes, minimize rework, and enhance overall project outcomes. Information sharing as a mediating variable is very dependent on the quality of information shared, and in turn, good information sharing can improve supply chain performance significantly. Accurate, complete, relevant and timely information enables more effective information sharing along the supply chain. Companies that prioritize both high-quality information and effective information sharing are likely to achieve superior supply chain performance, leading to more successful project completions and greater overall efficiency.

6. Contribution of the Research

This research has practical and theoretical contributions, which are as follows: To find out how much influence information quality has on supply chain performance by mediating information sharing in the construction domain. With information quality and effective information sharing, companies can carry out better planning and scheduling, reduce uncertainty, and increase operational efficiency. Then, good information quality can help identify areas where costs can be reduced and efficiency can be increased, such as better inventory management and reduced waiting times. This research can also develop scientific theory about supply chains from existing research.

The limited scope of the research area which is only in the Jakarta area by relying only on the population of two projects in Jakarta with a total of 100 respondents, is clearly insufficient to describe the actual conditions in the complex construction industry. Therefore, further research is needed on the influence of information quality on supply chain performance through information sharing in the construction industry with a larger area, population and number of respondents so that the research results obtained are more accurate.

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