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Integrating Digital SCOR and Quality Management in the Textile Industry

Evan Nugraha [1], Rini Mulyani Sari [2*], Rida Norina [3]
[1] Master of Technology Management Study Program, Faculty of Manufacturing Technology, Universitas Jenderal Achmad Yani, Cimahi City, West Java Province, Indonesia
[2*] Management Study Program, Faculty of Economics and Management, Universitas Jenderal Achmad Yani, Cimahi City, West Java Province, Indonesia
[3] Industrial Engineering Study Program, Faculty of Manufacturing Technology, Universitas Jenderal Achmad Yani, Cimahi City, West Java Province, Indonesia

Email: noe.rievan@mail.com [1], rini210283@gmail.com [2*], rida.reza.raffa@gmail.com [3]

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Abstract

The growing complexity of textile supply chains has increased the need for digital capabilities that enhance operational coordination, process integration, and quality management. The integration of digital supply chain standards with quality management remains important for improving supply chain outcomes in the textile industry. This study examines the relationship between the SCOR Digital Standard (SCOR DS) and Supply Chain Performance (SCP), with Quality Management (QM) serving as a mediating mechanism. A quantitative explanatory approach was employed using data from 320 personnel involved in supply chain, production, quality, and operational activities in the textile industry. Data were collected through structured Likert-scale questionnaires and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). SCOR DS has a significant positive effect on QM ($\beta = 0.454$, $p < 0.001$) and SCP ($\beta = 0.142$, $p = 0.009$). QM also has a stronger positive effect on SCP ($\beta = 0.484$, $p < 0.001$). Furthermore, QM significantly mediates the relationship between SCOR DS and SCP ($\beta = 0.220$, $p = 0.007$). Digital supply chain capabilities based on SCOR DS can strengthen supply chain performance, particularly when supported by effective quality management. The findings provide an integrated perspective for aligning digital SCOR practices with quality management to improve textile supply chain performance.

Keywords:
SCOR Digital Standard; Digital Supply Chain; Quality Management; Supply Chain Performance; Textile Industry.

1. INTRODUCTION

The textile industry relies on interconnected supply networks involving suppliers, manufacturers, distributors, and customers. Managing these relationships has become more demanding as firms must respond to changing demand while maintaining product quality, cost efficiency, delivery reliability, and operational continuity. Consequently, digital capabilities have become increasingly important for improving supply chain visibility, coordination, and decision-making (Han & Li, 2025; Briatore et al., 2025).

Digital transformation now extends beyond adopting individual technologies to integrating information, processes, and organizational capabilities. In supply chain environments, digitalization can improve supply–demand alignment, operational visibility, and coordination among supply chain partners (Li et al., 2025). It can also strengthen organizational agility by helping firms respond more effectively to changing market and operating conditions (Le et al., 2026).

The SCOR Digital Standard (SCOR DS) provides a structured framework for managing supply chain activities in a digitally enabled environment. It covers seven core processes Orchestrate, Plan, Order, Source, Transform, Fulfill, and Return while incorporating digital capabilities, performance, people, practices, and sustainability considerations (Teymourifar, 2026; Osman et al., 2025). For textile manufacturers, SCOR DS can support process coordination, information visibility, and performance assessment across supply chain activities.

However, digital capability alone does not necessarily lead to better supply chain performance. Digital information becomes valuable when organizations can use it to control processes, address problems, coordinate partners, and maintain consistent quality. Quality Management therefore provides an important organizational mechanism for translating digital information into process control and continuous improvement (Costa et al., 2024; Deng et al., 2025).

This perspective is increasingly reflected in research on supply chain quality and digital transformation. Supply Chain Quality Management 4.0 highlights the need to integrate digital technologies, supply chain management, and quality management rather than treating them as separate initiatives (Oliveira et al., 2026; Schmidt et al., 2023). However, empirical evidence remains limited on how a formal digital supply chain standard such as SCOR DS contributes to Supply Chain Performance through Quality Management, particularly in textile manufacturing.

The gap is therefore not simply whether digitalization improves Supply Chain Performance, but how this relationship occurs through organizational quality practices. This distinction is important because digital systems can provide information and visibility, while Quality Management determines how that information is used to control processes, coordinate partners, identify deviations, and support improvement. Examining this mechanism can help explain why comparable digital investments may produce different performance outcomes across organizations (Emon & Khan, 2025; Huang et al., 2023).

Accordingly, this study examines the relationships among SCOR Digital Standard, Quality Management, and Supply Chain Performance in the textile industry. It specifically assesses whether SCOR DS influences Quality Management and Supply Chain Performance and whether Quality Management mediates the relationship between SCOR DS and Supply Chain Performance. Through this model, the study seeks to clarify the role of quality practices in converting digital supply chain capabilities into performance outcomes.

The study offers two main contributions. Theoretically, it integrates digital supply chain standardization and Quality Management into one empirical framework, extending the discussion of digital transformation beyond technology adoption. Practically, it provides textile manufacturers with a basis for aligning digital supply chain practices with quality leadership, process control, continuous improvement, supplier quality integration, and customer quality integration to improve supply chain outcomes.

The remainder of the paper is organized as follows. The Research Method section explains the research design, sampling, measurement framework, data collection, and PLS-SEM procedures. The Results and Discussion section presents and interprets the empirical findings, followed by the Conclusions section, which summarizes the contributions, limitations, and directions for future research.

2. RESEARCH METHOD

2.1. Research Design

This study adopts a quantitative explanatory design to examine the relationships among the SCOR Digital Standard (SCOR DS), Quality Management (QM), and Supply Chain Performance (SCP) in the textile industry. SCOR DS is specified as the exogenous construct, QM as the mediating construct, and SCP as the endogenous outcome construct. The explanatory design was selected because the study aims to examine theoretically proposed relationships among these constructs using empirical survey data.

A structured questionnaire was used to obtain comparable assessments from personnel directly involved in supply chain, production, quality, and operational activities. This approach is appropriate for the study because the constructs represent organizational practices and capabilities that require respondents to have direct knowledge of their implementation. The use of PLS-SEM further enables the proposed direct and indirect relationships to be examined within a single structural model (Joshi & Sharma, 2022; Sahoo et al., 2025).

2.2. Population and Sampling

The target population comprised personnel working in textile companies that use digital technologies to support supply chain and operational activities. A total of 320 valid responses were obtained. Respondents were selected using purposive sampling based on predefined eligibility criteria. To participate in the study, respondents had to be directly involved in supply chain, production, quality, or operations and have at least three years of professional experience.

These criteria were established to ensure that participants had sufficient organizational knowledge to assess digital supply chain practices, quality management activities, and supply chain performance. The use of purposive sampling was considered appropriate because the study required respondents with direct exposure to the processes examined. The sampling approach therefore prioritized the relevance of respondent experience rather than general consumer representation.

2.3. Data Sources and Collection

The study employed primary survey data supported by secondary sources. Primary data were collected using a structured questionnaire, while secondary sources, including scientific publications, industry reports, and SCOR DS documentation, were used to develop the conceptual framework and operationalization of the constructs (Ntobongwana & Telukdarie, 2024; Zaman et al., 2025).

The questionnaire used a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The items measured respondents' perceptions of SCOR DS implementation, Quality Management practices, and Supply Chain Performance. Following data collection, the responses were screened for completeness, consistency, and missing observations. The final dataset contained 320 usable responses with no missing values.

2.4. Variables and Measurement

The research model consists of three latent constructs: SCOR Digital Standard, Quality Management, and Supply Chain Performance. SCOR DS was operationalized through seven dimensions: Orchestrate, Plan, Order, Source, Transform, Fulfill, and Return. These dimensions represent the major process areas through which digitally enabled supply chain activities are organized and coordinated (Abourokbah et al., 2026; Lahmar & Siddiqui, 2026).

Quality Management was measured through five dimensions: Quality Leadership, Process Quality Control, Continuous Improvement, Supplier Quality Integration, and Customer Quality Integration. Together, these dimensions capture the organizational practices used to establish quality direction, control processes, improve operations, and coordinate quality requirements with supply chain partners (Hafid et al., 2025; Sabău-Popa et al., 2026).

Supply Chain Performance was assessed through five dimensions: Reliability, Responsiveness, Agility, Cost Performance, and Asset Management. These dimensions reflect the ability of the supply chain to meet commitments consistently, respond to changes, adapt to disruptions, manage costs, and utilize operational resources effectively.

2.5. Research Model and Hypotheses

The proposed research model positions Quality Management as a mediator between SCOR Digital Standard and Supply Chain Performance. The model assumes that digital standardization of supply chain processes can provide information visibility, process coordination, and structured operational practices that support quality management. Stronger quality management is then expected to contribute to improved supply chain performance (Hu et al., 2026; Sahar et al., 2026).

Three direct relationships and one indirect relationship were examined. First, SCOR DS was expected to positively influence QM. Second, QM was expected to positively influence SCP. Third, SCOR DS was expected to have a direct positive effect on SCP. Finally, the indirect relationship between SCOR DS and SCP through QM was tested to determine whether QM acts as an intervening mechanism. Accordingly, the hypotheses are formulated as follows:

a. H1: SCOR Digital Standard has a positive effect on Quality Management.
b. H2: Quality Management has a positive effect on Supply Chain Performance.
c. H3: SCOR Digital Standard has a positive effect on Supply Chain Performance.
d. H4: Quality Management mediates the relationship between SCOR Digital Standard and Supply Chain Performance.

2.6. Data Analysis

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. PLS-SEM was selected because the proposed model contains multiple latent constructs, multidimensional measurement structures, and a mediating relationship that needs to be assessed simultaneously (Hair & Alamer, 2022; Mehta et al., 2026).

The analysis was conducted in two stages. First, the measurement model was evaluated to establish indicator reliability, internal consistency, convergent validity, and discriminant validity. Outer loadings, Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and the heterotrait-monotrait ratio (HTMT) were examined.

Second, the structural model was assessed to evaluate the hypothesized relationships among the constructs. Path coefficients (β), t-statistics, and p-values were used to determine the significance and direction of the structural relationships. The explanatory capability of the model was evaluated using R^2, while f^2 was used to assess the effect size of individual predictors. Predictive relevance was examined using Q^2. Bootstrapping was employed to assess the significance of the direct and indirect effects, following established PLS-SEM procedures (Guenther et al., 2023; Hermanu et al., 2024).

2.7. Research Procedure

The research was conducted through a sequence of stages. First, issues related to digital supply chain integration, quality management, and performance in the textile industry were identified. A review of relevant literature was then undertaken to establish the theoretical foundation and identify the research gap.

Based on the identified gap, the conceptual model and hypotheses were developed. The questionnaire was subsequently prepared based on the operational definitions of the three constructs. Respondent eligibility criteria were established before data collection was conducted.

After collection, the responses were screened for completeness and consistency. The resulting 320 valid observations were analyzed using SmartPLS 4. The findings were then interpreted to evaluate the proposed direct relationships and the mediating role of Quality Management.

2.8. Ethical Considerations

Participation in the study was voluntary. Respondents were informed of the general purpose of the research before completing the questionnaire. No personally identifying information was required for the statistical analysis, and the responses were treated confidentially. The results were reported in aggregate form to minimize the possibility of identifying individual respondents or participating organizations.

2.9. Methodological Limitations

Several methodological considerations should be acknowledged. First, purposive sampling limits the statistical generalizability of the findings because respondents were selected according to specific eligibility criteria. Second, the study relies on self-reported perceptions, which may introduce perceptual or common-method bias.

To reduce these potential limitations, respondent eligibility criteria were clearly defined, standardized questionnaire items were applied, and the dataset was screened before analysis. The reliability and validity of the measurement model were also assessed before testing the structural relationships. Future research may strengthen the evidence by applying probability-based sampling, longitudinal designs, objective performance indicators, or comparative research across industries and countries.

2.10. Research Framework

The research framework positions Quality Management between SCOR Digital Standard and Supply Chain Performance. This configuration allows the study to examine both the direct contribution of digital supply chain standardization to performance and the indirect pathway through quality management (Peng et al., 2026; Tanveer et al., 2026).

The model therefore reflects the proposition that digital capabilities may provide information visibility, coordination, and process structure, while quality management provides the organizational routines required to translate these capabilities into operational outcomes.

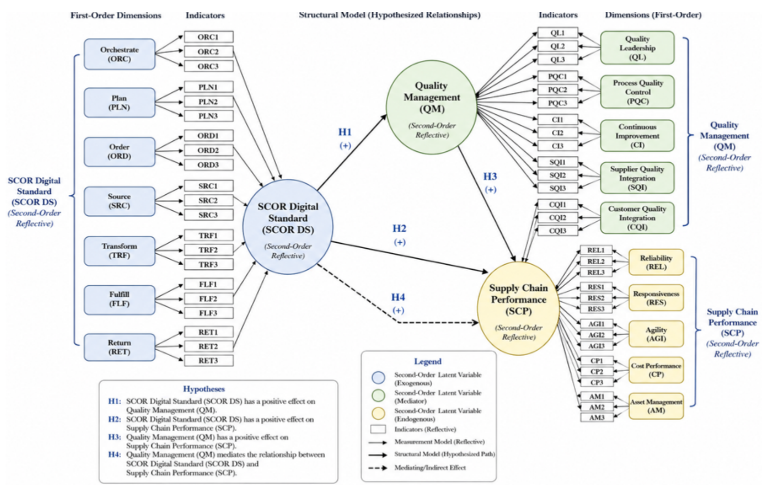

Figure 1. Research Framework SCOR Digital Standards, Quality Management, and Supply Chain Performance

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1. Respondent Profie

A total of 320 valid responses were included in the analysis. The respondents were personnel working in supply chain, production, quality, and operational functions within the textile industry. The sample was restricted to individuals who had direct involvement in supply chain or quality-related activities and sufficient professional experience to evaluate digital supply chain practices and quality management processes. No missing observations were identified in the final dataset; therefore, all 320 responses were retained for subsequent analysis.

Table 1. Respondent Characteristics

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	176	55
	Female	144	45
Age	< 30 years	64	20
	30 – 39 years	144	45
	40 – 49 years	80	25
	≥ 50 years	32	10
Education	Diploma/Associate Degree	48	15
	Bachelor’s Degree	208	65
	Master’s Degree	48	15
	Doctoral Degree	16	5
Position/Function	Supply Chain	96	30
	Production	80	25
	Quality	64	20
	Operations	80	25
Work Experience	3 – 5 years	80	25
	6 – 10 years	128	40
	11 – 15 years	64	20
	> 15 years	48	15
Company Experience with Digital System	1 – 3 years	112	35
	4 – 6 years	112	35
	7 – 10 years	64	20
	> 10 years	32	10
Company Size	Small	160	50
	Medium	112	35
	Large	48	15

As presented in Table 1, the respondents represented diverse demographic and professional backgrounds, with the largest group aged 30–39 years (45.0%) and 40.0% reporting 6–10 years of work experience. Most respondents held a Bachelor’s degree (65.0%), while supply chain personnel constituted the largest functional group (30.0%), followed by production and operations (25.0% each) and quality personnel (20.0%). This profile indicates that the respondents generally possessed sufficient professional experience and educational backgrounds to assess digital supply chain and quality management practices.

Regarding digital-system exposure, 35.0% of respondents reported 1–3 years and another 35.0% reported 4–6 years of organizational experience with digital systems, indicating substantial familiarity with digitalized operations. Small companies represented the largest organizational group (50.0%), followed by medium-sized (35.0%) and large companies (15.0%), reflecting variation in organizational contexts. Overall, the respondent characteristics provide a relevant empirical foundation for examining how the SCOR Digital Standard (SCOR DS) relates to Quality Management (QM) and, subsequently, Supply Chain Performance (SCP).

3.1.2. Descriptive Statistics

Descriptive statistics were used to summarize respondents’ perceptions of the three principal constructs and their respective dimensions. The analysis includes the mean, median, standard deviation, minimum, and maximum values based on 320 valid responses. The mean reflects the central tendency of responses, while the standard deviation indicates the extent of variation in respondents’ assessments.

Table 2. Descriptive Statistics

Construct	Dimension	Mean	Median	Std. Dev.	Minimum	Maximum
SCOR Digital Standards	Orchestrate	3.213	3.000	0.552	1.000	5.000
	Plan	3.210	3.000	0.590	1.000	5.000
	Order	3.240	3.000	0.607	2.000	5.000
	Source	3.128	3.000	0.671	1.000	5.000
	Transform	3.224	3.000	0.651	1.000	5.000
	Fulfill	3.203	3.000	0.671	1.000	5.000
	Return	3.203	3.000	0.590	2.000	5.000
Quality Management	Quality Leadership	2.071	2.000	0.692	1,000	5.000
	Process QC	1/945	2.000	0.667	1.000	5/000

	Continuous Improvement	1.969	2.000	0.642	1.000	5.000
	Supplier Quality Integration	1.748	2.000	0.713	1.000	5.000
	Customer Quality Integration	1.972	2.000	0.696	1.000	5.000
Supply Chain Performance	Reliability	2.261	2.000	0.772	1.000	5.000
	Responsiveness	2.240	2.000	0.666	1.000	5.000
	Agility	2.164	2.000	0.753	1.000	5.000
	Cost Performance	2.197	2.000	0.764	1.000	5.000
	Asset Management	2.135	2.000	0.800	1.000	5.000

Table 2 summarizes respondents' assessments of the three main constructs and their respective dimensions. SCOR DS received relatively higher mean scores, ranging from 3.128 for Source to 3.240 for Order, compared with Quality Management, which ranged from 1.748 for Supplier Quality Integration to 2.071 for Quality Leadership. Supply Chain Performance showed mean values between 2.135 for Asset Management and 2.261 for Reliability, indicating a lower overall assessment than SCOR DS.

This difference suggests that respondents viewed digital supply chain practices more positively than the quality management practices and performance outcomes examined in the study. The median scores support this pattern, with most SCOR DS dimensions centered at 3.000, while QM and SCP dimensions were generally centered at 2.000. Standard deviations ranging from 0.552 to 0.800 indicate a moderate level of variation in respondents' assessments.

Overall, the descriptive results provide useful context for interpreting the structural model. The stronger assessment of SCOR DS alongside the lower scores for QM and SCP suggests that digital capabilities may not be sufficient unless supported by effective quality-oriented organizational practices. This issue is further examined through the structural and mediation analyses to determine whether Quality Management helps translate digital supply chain capabilities into improved performance.

3.1.3. First Order Measurement Model

The first-order measurement model was examined to establish whether the 51 indicators adequately captured the 17 dimensions underlying SCOR Digital Standard (SCOR DS), Quality Management (QM), and Supply Chain Performance (SCP). The assessment focused on outer loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE), covering indicator reliability, internal consistency, and convergent validity. The results of this assessment are reported in Table 3.

Table 3. First Order Measurement Model

Construct	Dimension	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability	AVE	Decision
SCOR Digital Standards	Orchestrate	ORC 1	0.776	0.900	0.932	0.662	Valid & Reliable
		ORC 2	0.866				
		ORC 3	0.752				
	Plan	PLN 1	0.808				
		PLN 2	0.785				
		PLN 3	0.823				
	Order	ORD 1	0.856				
		ORD 2	0.891				
		ORD 3	0.816				
	Source	SRC 1	0.742				
		SRC 2	0.859				
		SRC 3	0.797				
	Transform	TRF 1	0.878				
		TRF 2	0.868				
		TRF 3	0.783				
	Fulfill	FLF 1	0.796				
		FLF 2	0.848				
		FLF 3	0.855				
	Return	RET 1	0.825				
		RET 2	0.904				
		RET 3	0.806				
Quality Management	Quality Leadership	QL 1	0.832	0.858	0.832	0.502	Valid & Reliable*
		QL 2	0.878				
		QL 3	0.852				
	Process Quality Control	PQC 1	0.784				

		PQC 2	0.771				
		PQC 3	0.797				
	Continuous Improvement	CI 1	0.925				
		CI 2	0.913				
		CI 3	0.779				
	Supplier Quality Integration	SQI 1	0.836				
		SQI 2	0.852				
		SQI 3	0.827				
	Customer Quality Integration	CQI 1	0.794				
		CQI 2	0.846				
		CQI 3	0.856				
Supply Chain Performance	Reliability	REL 1	0.795	0.871	0.888	0.613	Valid & Reliable
		REL 2	0.808				
		REL 3	0.789				
	Responsiveness	RES 1	0.822				
		RES 2	0.854				
		RES 3	0.790				
	Agility	AGI 1	0.765				
		AGI 2	0.768				
		AGI 3	0.800				
	Cost Performance	CP 1	0.732				
		CP 2	0.815				
		CP 3	0.816				
	Asset Management	AM 1	0.763				
		AM 2	0.774				
		AM 3	0.776				

The findings show that the indicators performed satisfactorily, with outer loadings ranging from 0.732 to 0.925 and remaining above the 0.70 benchmark. SCOR DS recorded strong reliability and convergent validity ($\alpha = 0.912$; CR = 0.932; AVE = 0.662), while QM ($\alpha = 0.705$; CR = 0.832; AVE = 0.502) and SCP ($\alpha = 0.842$; CR = 0.888; AVE = 0.613) also reached the required levels. Several indicators, including PQC2, PQC3, CI3, CQI1, AGI1, AGI2, CP1, and AM1–AM3, had relatively lower loadings, but their values remained above 0.70, so no indicator required removal at this stage.

Taken together, the measurement results indicate that the three constructs were measured with acceptable reliability and convergent validity. The AVE values were above 0.50, while the reliability coefficients met the generally accepted criteria, indicating that the indicators adequately represented their respective dimensions. On this basis, the analysis can proceed to the evaluation of the higher-order constructs and the structural relationships among SCOR DS, QM, and SCP.

3.1.4. Higher Order Construct Measurement

Following the assessment of the first-order measurement model, the higher-order construct measurement was examined to determine whether the underlying dimensions adequately represented the three main constructs: SCOR Digital Standard (SCOR DS), Quality Management (QM), and Supply Chain Performance (SCP). This assessment is important because each main construct is formed by several related first-order dimensions that capture different aspects of the broader concept. Table 4 presents the dimension loadings obtained from the higher-order construct assessment.

Table 4. Higher Order Construct Measurement

Higher Order Construct	First Order Dimension	Dimension Loading
SCOR Digital Standards	Orchestrate	0.798
	Plan	0.805
	Order	0.854
	Source	0.799
	Transform	0.843
	Fulfill	0.833
	Return	0.845
Quality Management	Quality Leadership	0.854
	Process Quality Control	0.784
	Continuous Improvement	0.872
	Supplier Quality Integration	0.838

	Customer Quality Integration	0.832
Supply Chain Performance	Reliability	0.797
	Responsiveness	0.822
	Agility	0.778
	Cost Performance	0.788
	Asset Management	0.771

The results show that the dimension loadings ranged from 0.771 to 0.872, with all values exceeding the commonly accepted threshold of 0.70. For SCOR DS, Order recorded the highest loading (0.854), followed by Return (0.845) and Transform (0.843), while Orchestrate showed the lowest loading (0.798). For QM, Continuous Improvement produced the highest loading (0.872), whereas Process Quality Control had the lowest (0.784); meanwhile, Responsiveness showed the strongest contribution to SCP (0.822), followed by Reliability (0.797) and Cost Performance (0.788).

Overall, the findings indicate that the first-order dimensions provide adequate representation of their respective higher-order constructs. The relatively consistent loading values across SCOR DS, QM, and SCP suggest that no single dimension dominates the measurement structure, while each dimension contributes meaningfully to its broader construct. These results therefore support the use of SCOR DS, QM, and SCP as higher-order constructs in the subsequent structural model assessment.

3.1.5. Discriminant Validity Assessment

Following the assessment of the higher-order measurement model, discriminant validity was examined to determine whether SCOR Digital Standard (SCOR DS), Quality Management (QM), and Supply Chain Performance (SCP) represent distinct constructs within the research model. The heterotrait–monotrait ratio (HTMT) was employed to assess the degree of similarity between the constructs, with values below 0.85 indicating satisfactory discriminant validity. The HTMT results for the three higher-order constructs are presented in Table 5.

Table 5. Discriminant Validity Assessment Using HTMT

Construct	SCOR Digital Standards	Quality Management	Supply Chain Performance
SCOR Digital Standards	-	0.520	0.219
Quality Management	0.520	-	0.498
Supply Chain Performance	0.219	0.498	-

As shown in Table 5, the HTMT value between SCOR DS and QM was 0.520, while the values between SCOR DS and SCP and between QM and SCP were 0.219 and 0.498, respectively. All values were substantially below the conservative threshold of 0.85, indicating that the constructs do not exhibit excessive conceptual overlap. The relatively low HTMT values, particularly between SCOR DS and SCP, further suggest that the three constructs capture different aspects of the proposed research model.

Overall, the findings provide evidence that discriminant validity was established among SCOR DS, QM, and SCP. This indicates that each higher-order construct retains sufficient empirical distinctiveness from the others and can therefore be interpreted as a separate construct in the structural model. The results support proceeding to the subsequent assessment of the structural relationships and hypothesis testing.

3.1.6. Structural Model and Hypothesis Assessment

Following the evaluation of the measurement model, the structural model was assessed to examine the proposed relationships among SCOR Digital Standard (SCOR DS), Quality Management (QM), and Supply Chain Performance (SCP). The analysis considered the path coefficients (β), t-statistics, and p-values to evaluate the direction and statistical significance of the hypothesized relationships are presented in Table 6.

Table 6. Structural Model and Hypothesis Assessment

Hypothesis	Structural Path	β	t – value	p - value	Decision
H_1	SCOR DS → QM	0.454	5.784	< 0.001	Supported
H_2	SCOR DS → SCP	0.142	2.629	0.009	Supported
H_3	QM → SCP	0.484	4.061	< 0.001	Supported
H_4	SCOR DS → QM → SCP	0.220	2.692	0.007	Supported (Mediating Effect)

Table 6 shows that all four hypotheses were supported. SCOR DS had a positive and significant effect on QM ($\beta = 0.454$, $t = 5.784$, $p < 0.001$), supporting H1, while QM positively affected SCP ($\beta = 0.484$, $t = 4.061$, $p < 0.001$), supporting H2. SCOR DS also had a positive direct effect on SCP ($\beta = 0.142$, $t = 2.629$, $p = 0.009$), supporting H3.

The indirect effect of SCOR DS on SCP through QM was positive and significant (β = 0.220, t = 2.692, p = 0.007), supporting H4. Because both the direct and indirect effects were significant, QM can be interpreted as a partial mediator in the relationship between SCOR DS and SCP. This result indicates that digital supply chain capability contributes to performance both directly and through quality management practices.

The coefficient for QM → SCP (β = 0.484) was notably higher than that for SCOR DS → SCP (β = 0.142). This difference suggests that digital standardization may support performance, but its benefits are more strongly associated with the quality practices used to manage and improve supply chain processes. Overall, the findings indicate that SCOR DS strengthens QM and SCP, while QM provides an additional pathway for converting digital capabilities into supply chain performance.

3.1.7. R², f², and Q2 Assessment

Following the hypothesis assessment, the explanatory power and effect sizes of the structural model were evaluated using the coefficient of determination (R^2) and effect size (f^2). R^2 indicates the proportion of variance in an endogenous construct explained by its predictor constructs, while f^2 assesses the contribution of an individual predictor to the explained variance of an endogenous construct. The results of these assessments are presented in Tables 7, Table 8, and Table 9.

Tabel 7. R^2 Assessment

Construct	R	Adjusted R^2
Quality Management (QM)	0.206	0.204
Supply Chain Performance (SCP)	0.192	0.187

As shown in Table 7, the model explained 20.6% of the variance in Quality Management (QM), with an R^2 of 0.206 and an adjusted R^2 of 0.204. For Supply Chain Performance (SCP), the model explained 19.2% of the variance, with an R^2 of 0.192 and an adjusted R^2 of 0.187. These results indicate that SCOR DS contributes to explaining variations in QM, while SCOR DS and QM jointly account for a portion of the observed variation in SCP.

Table 8. f^2 Assessment

Structural Path	f^2	Effect Size
SCOR DS → QM	0.260	Medium
SCOR DS → SCP	0.200	Medium
QM → SCP	0.230	Medium

The f^2 results in Table 8 indicate medium effect sizes for all three structural relationships. SCOR DS showed a medium effect on QM (f^2 = 0.260), while its effect on SCP was also medium (f^2 = 0.200), and QM demonstrated a medium effect on SCP (f^2 = 0.230). These findings suggest that both digital supply chain practices and quality management make meaningful contributions to the structural relationships examined in the model, with SCOR DS having a relatively stronger effect on QM and QM contributing substantially to SCP.

Table 9. Q^2 Assessment

Endogenous Construct	SSO	SSE	Q^2	Predictive Relevance
Quality Management (QM)	8.656	7.052	0.185	Yes
Supply Chain Performance (SCP)	12.562	9.439	0.249	Yes

The Q^2 results presented in Table 9 indicate that the structural model has predictive relevance for both endogenous constructs. Quality Management (QM) obtained a Q^2 value of 0.185, while Supply Chain Performance (SCP) recorded a higher value of 0.249. Since both Q^2 values are greater than zero, the results confirm that the model possesses predictive relevance for explaining QM and SCP, with the predictive relevance being relatively stronger for SCP.

3.1.8. Hypothesis Testing

Hypothesis testing was conducted to determine whether the proposed relationships among SCOR Digital Standard (SCOR DS), Quality Management (QM), and Supply Chain Performance (SCP) were statistically supported. The assessment considered the path coefficient (β), t-value, and p-value obtained from the structural model, with a significance level of 5%. Table 6 summarizes the results of the four hypotheses proposed in this study, that can be seen in Figure 2.

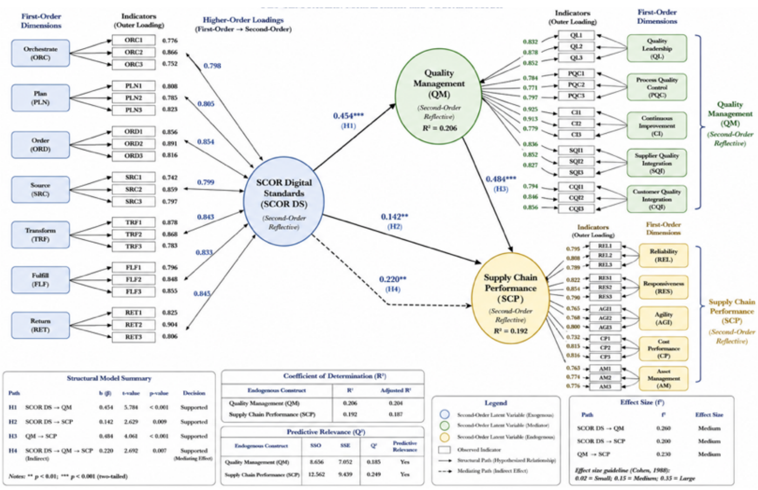

Figure 2. Measurement and Structural Model with First-Order Indicators and Second-Order Constructs

Hypothesis testing was conducted to determine whether the proposed relationships among SCOR Digital Standard (SCOR DS), Quality Management (QM), and Supply Chain Performance (SCP) were statistically supported. The assessment considered the path coefficient (β), t-value, and p-value obtained from the structural model, with a significance level of 5%. Table 6 summarizes the results of the four hypotheses proposed in this study.

The findings indicate that all four hypotheses were supported, confirming significant relationships among the constructs. SCOR DS had a positive and significant effect on QM ($\beta = 0.454$, $t = 5.784$, $p < 0.001$), while its direct effect on SCP was also significant ($\beta = 0.142$, $t = 2.629$, $p = 0.009$), supporting H1 and H2. QM had a stronger positive effect on SCP ($\beta = 0.484$, $t = 4.061$, $p < 0.001$), and the significant indirect effect of SCOR DS on SCP through QM ($\beta = 0.220$, $t = 2.692$, $p = 0.007$) supported H3 and H4.

These results indicate that digital supply chain practices contribute to supply chain performance through both direct and quality-management-related mechanisms. The stronger effect of QM on SCP compared with the direct effect of SCOR DS on SCP suggests that quality management may serve as an important mechanism for converting digital supply chain capabilities into operational performance improvements. The significant mediation effect further indicates that strengthening SCOR DS alone may not be sufficient, as its performance benefits can be enhanced when supported by effective quality management practices.

3.1.9. Mediation Analysis

Mediation analysis was conducted to examine whether Quality Management acts as a pathway linking SCOR Digital Standard to Supply Chain Performance. The indirect effect was positive and significant ($\beta = 0.220$, $t = 2.692$, $p = 0.007$), indicating that SCOR DS contributes to SCP through QM. Since the direct effect also remained significant ($\beta = 0.142$, $p = 0.009$), the findings indicate partial rather than full mediation.

This result suggests that SCOR DS affects Supply Chain Performance through both direct and QM-related pathways. Digital standardization can improve process visibility, information access, and coordination across supply chain activities. However, these capabilities are more likely to generate meaningful outcomes when supported by practices that control processes, address deviations, and coordinate supply chain partners.

The mediation finding therefore positions Quality Management as an important organizational complement to digital supply chain capability. Digitalization does not replace established quality practices; instead, its performance benefits can be strengthened when digital capabilities are embedded within systematic quality routines. For textile manufacturers, this highlights the importance of developing digital processes and quality practices as complementary rather than separate initiatives.

3.2. Discussion

The structural results provide support for the proposed relationships among SCOR Digital Standard, Quality Management, and Supply Chain Performance. The findings show that SCOR DS is positively associated with QM and SCP, while QM has a stronger direct association with SCP. The significant indirect effect further indicates that QM represents an important pathway connecting digital supply chain capability with performance. The results should therefore be interpreted not as evidence that digitalization alone determines supply chain performance, but as evidence of an interconnected capability structure in which digital processes and quality-oriented organizational routines reinforce one another.

3.2.1. H1: SCOR Digital Standard and Quality Management

H1 was supported, with SCOR DS showing a positive and significant relationship with QM ($\beta = 0.454$, $t = 5.784$, $p < 0.001$). This finding indicates that more structured digital supply chain processes are associated with stronger quality management practices. The finding is consistent with Sahoo et al. (2025), who examined digital dexterity, supply chain quality management, agility, and performance among 291 Indian B2B manufacturers and highlighted the interaction between digital capabilities and supply chain quality management.

One possible explanation is that digital supply chain standardization improves the availability and timeliness of operational information. When information from planning, sourcing, production, fulfillment, and returns is more systematically organized, organizations have better opportunities to identify deviations and coordinate corrective actions. This interpretation is consistent with Dixit et al. (2024), who highlighted the relationship between digital dexterity and supply chain quality management, as well as Khan et al. (2026), who emphasized the role of digital capabilities in improving information integration and operational visibility.

The finding extends this discussion by examining digital capability through the SCOR DS framework. Rather than treating digitalization as a collection of individual technologies, the study considers it as a structured set of supply chain processes. This perspective suggests that the contribution of SCOR DS to quality management lies not only in increasing access to information but also in creating a more coordinated environment for planning, controlling, and improving supply chain activities.

3.2.2. H2: SCOR Digital Standard and Supply Chain Performance

H2 was supported, with QM demonstrating the strongest direct relationship in the model with SCP (β = 0.484, t = 4.061, $p < 0.001$; f^2 = 0.230). The result indicates that quality management represents an important organizational capability for achieving stronger supply chain outcomes. This finding is consistent with Aninda & Karyani (2022), whose empirical study of Indonesian firms found that supply chain digitalization positively affected operational performance.

The finding is consistent with research emphasizing the contribution of supply chain quality management to operational performance (Ning & Yao, 2023; Al Tera et al., 2024). Quality leadership, process control, continuous improvement, and coordination with suppliers and customers can help reduce process variation, improve consistency, and support more reliable supply chain operations. The relatively stronger coefficient for QM → SCP compared with SCOR DS → SCP is particularly relevant. It suggests that digital capability may provide the infrastructure and information required for improvement, while quality management provides the organizational routines through which those resources are converted into operational results.

3.2.3. H3: Quality Management and Supply Chain Performance

H3 was supported, with SCOR DS having a positive and significant direct relationship with SCP (β = 0.142, t = 2.629, p = 0.009). Although the coefficient is smaller than the QM → SCP relationship, the finding indicates that digital supply chain standardization is directly associated with supply chain performance. It also suggests that improvements in quality leadership, process quality control, continuous improvement, supplier quality integration, and customer quality integration can contribute to more reliable and responsive supply chain operations (Burgess et al., 2023).

Digital processes can facilitate information visibility, coordination, responsiveness, and more consistent execution of supply chain activities. These mechanisms are consistent with previous findings linking supply chain digitalization with supply chain capabilities and performance (Rana et al., 2025; Sahoo et al., 2025; Zhao et al., 2023). At the same time, the relatively modest coefficient indicates that digitalization should not be viewed as a sufficient condition for superior performance. The result is better interpreted as evidence that digital capability constitutes one component of a broader organizational capability system.

3.2.4. H4: The Mediating Role of Quality Management

H4 was supported because the indirect effect of SCOR DS on SCP through QM was positive and significant (β = 0.220, t = 2.692, p = 0.007). Because the direct SCOR DS → SCP relationship also remained significant, the result indicates partial mediation. This finding provides a more nuanced explanation of the relationship between digitalization and supply chain performance. Digital supply chain capability may create greater visibility and coordination, but Quality Management helps organizations use those capabilities systematically through process control, continuous improvement, and collaboration with supply chain partners.

The result is consistent with Zhou et al. (2022), who identified a mediating role for supply chain quality management in the relationship between traceability and performance. It also complements Sahoo et al. (2025), whose findings connect digital dexterity, supply chain quality management, agility, and performance. These studies, together with the present findings, suggest that digital capabilities are more likely to generate performance benefits when supported by organizational routines that guide the use of digital information. In addition, Ayadi et al. (2024) found partial mediation in the digital dexterity–supply chain performance relationship, further supporting the argument that digital capabilities can influence performance through intermediate organizational capabilities such as quality management.

The mediation finding therefore represents an important contribution of this study. While earlier research has examined digitalization, quality management, and supply chain performance in different combinations, the present study integrates these relationships through the SCOR Digital Standard framework and demonstrates that QM provides a meaningful pathway between digital supply chain capability and performance. The result also provides a possible explanation for the relatively modest direct effect of SCOR DS on SCP: digitalization may create the conditions for improvement, but quality management determines how effectively those conditions are converted into operational results.

The findings provide several implications for textile industry managers. First, digital supply chain initiatives should be implemented as process-oriented programs rather than as isolated technology investments. The positive relationship between SCOR DS and QM indicates that digital process standardization can support the availability, coordination, and use of information required for quality management.

Second, managers should strengthen quality management practices alongside digital implementation. The relatively stronger relationship between QM and SCP ($\beta = 0.484$) indicates that quality-oriented routines are particularly important for achieving performance improvements. Priority should therefore be given to quality leadership, process quality control, continuous improvement, supplier quality integration, and customer quality integration.

Third, supplier and customer interfaces require particular attention. Digital visibility is most useful when information can be shared and acted upon across organizational boundaries. Textile manufacturers can therefore use digital supply chain processes to improve the monitoring of supplier quality, coordinate quality requirements with customers, and respond more quickly to deviations.

Fourth, managers should evaluate digital transformation using operational performance outcomes rather than technology adoption alone. Indicators such as reliability, responsiveness, agility, cost performance, and asset utilization can be used alongside digital implementation measures to determine whether digital investments are producing meaningful operational benefits.

Finally, the partial mediation result suggests that digital transformation and quality management should be managed as complementary initiatives. A digital implementation program that is not accompanied by appropriate quality routines may not fully realize its potential. Managers should therefore align digital process design, quality governance, employee capabilities, supplier coordination, and continuous improvement within a common transformation agenda.

4. CONCLUSION

This study examined the relationships among the SCOR Digital Standard (SCOR DS), Quality Management (QM), and Supply Chain Performance (SCP) in the textile industry. The empirical results supported all four proposed relationships. SCOR DS had a positive and significant relationship with QM ($\beta = 0.454$, $p < 0.001$) and SCP ($\beta = 0.142$, $p = 0.009$), while QM showed a stronger positive relationship with SCP ($\beta = 0.484$, $p < 0.001$). The indirect effect of SCOR DS on SCP through QM was also significant ($\beta = 0.220$, $p = 0.007$), indicating partial mediation.

The findings suggest that digital supply chain capability and quality management should not be treated as separate improvement agendas. SCOR DS can provide greater process structure, information visibility, and coordination, whereas Quality Management provides the organizational routines needed to use these capabilities for process control, corrective action, supplier and customer coordination, and continuous improvement. The stronger relationship between QM and SCP further indicates that organizational quality practices are particularly important in translating digital capability into operational outcomes.

The study contributes to the literature by integrating SCOR DS, Quality Management, and Supply Chain Performance within a single empirical framework. In particular, the mediation result provides evidence that the relationship between digital supply chain capability and performance involves an organizational pathway rather than being exclusively technological. This extends the discussion of digital supply chain transformation by emphasizing the complementary role of quality management.

For textile manufacturers, the findings indicate that digital investments should be accompanied by quality leadership, process quality control, continuous improvement, and stronger integration with suppliers and customers. Digital transformation initiatives may therefore be more effective when their implementation is aligned with established quality management routines and performance objectives.

Several limitations should be considered. The cross-sectional design restricts the ability to establish temporal or causal relationships, while the use of perceptual survey measures may introduce response and common-method bias. In addition, the focus on the textile industry limits the extent to which the findings can be generalized to other sectors. Future research could address these limitations through longitudinal designs, objective performance indicators, probability-based sampling, cross-industry comparisons, and cross-country studies. Future models may also incorporate digital maturity, supply chain integration, resilience, innovation capability, and environmental uncertainty.

Overall, the findings indicate that the value of digital supply chain transformation is strengthened when digital capabilities are embedded within effective quality management practices. The integration of SCOR DS and Quality Management therefore provides a practical and theoretically relevant pathway for improving supply chain performance in the textile industry.

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