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THE IMPACT OF DIGITAL SUPPLY CHAIN IN ENHANCING OPERATIONAL QUALITY SYSTEMS: THE MEDIATING INFLUENCE OF SUSTAINABLITY

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Abstract

This paper explores the role of DIGITAL SUPPLY CHAIN in enhancing the OPERATIONAL QUALITY SYSTEMS in the Jordanian industrial industry as well as discussing the moderating effect of SUSTAINABLITY. The recent quick pace of digitalization among supply chains, and especially in developing economies, has heightened the necessity of responsive logistical capacities which react effectively to varying market and operations circumstances. Quantitative research designing methodology was adopted and a structured survey questionnaire was administered to employees of the supply chain and operations departments of a sample of Jordanians industrial firms. The proposed direct and indirect relationships were tested using partial least squares structural equation modeling (PLS-SEM). The results show that DIGITAL SUPPLY CHAIN has a strong positive influence on OPERATIONAL QUALITY SYSTEMS and has a strong impact on SUSTAINABLITY. Besides, the findings validate the significant mediating effects of SUSTAINABLITY, which means that the effects of adaptive logistics on smart quality performance are enhanced in case environmentally responsible and sustainability-oriented sourcing policies are combined. This highlights the role of digitally accommodating logistics systems in supporting quality by improving transparency, better management use of resources, and sustainable sourcing decisions. The research shows that strategic alignment of DIGITAL SUPPLY CHAIN with SUSTAINABLITY can significantly enhance OPERATIONAL QUALITY SYSTEMS. The findings provide practical information to supply chain managers, sustainability leaders, and decision-makers who intend to develop resilient and data-driven and environmentally sustainable industrial processes in Jordan.

Keywords: Green Procurement, Eco-Friendly Procurement, Real-Time Delivery Adjustment, OPERATIONAL QUALITY SYSTEMS, SUSTAINABLITY.

1. INRODUCTION

The fast-growing technological advancement, the growing intensity of global competition, and the increased need of flexibility have transformed the potential of the logistics and enhanced the use of digital solutions in the supply chains [1]. The contemporary companies must provide more efficient, quicker, and less expensive operations and remain steadfast during the disruptures and in line with sustainability demands [2]. To support these needs, digital logistics systems have become more popular in organizations to improve flexibility, resilience, and end-to-end visibility throughout operational flows [3]. Specifically, DIGITAL SUPPLY CHAIN has become a critical factor in helping companies to react fast to the changing demand tendencies, reduce the decision-making time, and enhance real-time logistical coordination [4].

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At the same time, transition to the Smart Operational Quality System has completely changed the ways of addressing quality assurance by the industrial firms. Such smart systems make use of real-time tracking, predictive analytics, and autonomous decision-making engines to provide greater accuracy and operational sensitivity than traditional quality management tools [5]. Combined with digitally adaptive logistics functions, they contribute to continuous improvement and improve the overall operational performance [6]. Nevertheless, this integration is not only successful when a company has technological capacity but also the strategic alignment of sourcing decisions and sustainability objectives. SUSTAINABLITY constitute one of the major pillars of sustainable supply chain management and is seen as a self-governing company earnest to procure ecologically friendly suppliers, minimize waste, and incorporate environmental concerns into its procurement process [7]. These practices contribute to the heightening of regulatory compliance, decrease operational risks and boost long-term resilience of the supply chain. The interplay between SUSTAINABLITY and the digital logistic competencies puts companies in a position to attain operational perfection and ecological maintainability simultaneously [8]. Although the themes are becoming increasingly relevant, little empirical data has been conducted to explore the combined effect of DIGITAL SUPPLY CHAIN and SUSTAINABLITY on OPERATIONAL QUALITY SYSTEMS, especially in the developing economies where digital transformation is being realized unevenly [9]. Although the available literature indicates that modernization of logistics functions could enhance quality outcome, the way in which sustainable sourcing enhances the same has not been explored adequately in the context of the industrial sector of Jordan. This is why this research tries to examine how SUSTAINABLITY is a mediator between DIGITAL SUPPLY CHAIN and OPERATIONAL QUALITY SYSTEMS. By sealing this gap, the study provides information to industrial companies that aim at progressing operational excellence and sustainability performance by using combined digital and sourcing strategies.

1.1. Research Problem

DIGITAL SUPPLY CHAIN allows companies to be able to react fast to market changes, technology shocks, and uncertainty in the supply chain. With current resource-constricted industrial environments, however, building and maintaining these adaptive abilities is a major challenge [10]. A lot of companies do not have the digital infrastructure, real-time data integration, and analytics that agile logistics operations need to run properly. This constraint limits the realization of the logistics flexibility to the maximum and compromises the attempts to produce the consistent performance advancement. Another issue that becomes a complication is the poor connection between digital logistics capabilities and procurement systems. In cases where the sourcing practices are conventional, disjointed, and environmentally in-sensitive, the value potential to be generated through logistics Adaptiveness becomes watered down [11]. Though earlier research has linked that logistics Adaptiveness influences operational and quality performance positively, these advantages are not always optimal when they are not supported and implemented by SUSTAINABLITY, that are environmentally responsible and prevent waste and influencer compliance. Thus, the main research issue involves the necessity to align DIGITAL

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SUPPLY CHAIN and quantifiable and sustainability-based sourcing practices that could support OPERATIONAL QUALITY SYSTEMS. The question is how SUSTAINABLITY act as a facilitating factor, enhancing the impact of digital logistics potential on intelligent quality results, especially in the industrial segments with uneven rates of technological adoption and sustainability efforts that are yet to be developed.

1.2. Research Gap

The concept of SUSTAINABLITY is becoming a key element of sustainable supply chain management, the role of mediating between DIGITAL SUPPLY CHAIN and the quality management consequences is yet to be explored. Current literature has the tendency of investigating either digital supply chain Adaptiveness or sustainability practices in isolation without the evaluation of the sustainability sourcing as a mediator process that enhances quality performance as demonstrated by previous literature [12]. This leaves in conceptual and empirical gap how adaptive logistics capabilities can be converted into better OPERATIONAL QUALITY SYSTEMS when environmental issues are incorporated in the procurement decisions. In addition, this correlation is not highly acknowledged in emerging markets such as Jordan where the digital transformation of logistics is evolving in an uneven manner and sometimes due to fragmented infrastructure and resource shortages. So far, no empirical research in Jordan has shown the ability of DIGITAL SUPPLY CHAIN to enhance the quality results of operations using the involvement of the green sourcing process. In high-level economies, the majority of the research follows either narrow or unidimensional approaches ignoring the interactive or complementary relationships between digitally adaptable logistics functions and sustainability-oriented sourcing. In order to fill these limitations, the current research work intends to formulate a complete framework that empirically incorporates Digital Logistics Adaptiveness, SUSTAINABLITY, and OPERATIONAL QUALITY SYSTEMS among the industrial companies in Jordan. Such a contribution helps the body of theory and offers a practical insight into the construction of sustainable supply chain systems using technology and performance in new industrial settings.

2. LITERATURE REVIEW

2.1 Green Procurement:

Green Procurement focuses on sourcing choices that focus on environmental performance, efficiency of resources and compliance with regulations. It is a move to make companies select suppliers with eco-certified processes, waste minimization, and low-impact production standards [13]. It is attested in the literature that Green Procurement improves operational efficiency through lead reduction of waste, reduction of lifecycle cost, and environmentally friendly supply chain conduct [14]. Green Procurement in digitally adaptive logistics in digitally adaptive logistics environments, Green Procurement has a complementary role of improving traceability, minimizing material variability, and allowing some degree of consistency between inputs leading to OPERATIONAL QUALITY SYSTEMS especially in new markets such as Jordan [15].

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2.2 Eco-Friendly Procurement:

Eco-Friendly Procurement aims at reducing the environmental impact of material, packaging and transportation practices. These encompass the sourcing of recyclable material, minimizing of emission by consolidated shipments and use of cleaner production inputs [16]. Studies have indicated that sustainable procurement leads to an increase in sustainability performance, an improvement in stakeholder trust, and minimization of operations risks related to environmentally unfriendly materials [17]. As a part of Digital Logistics Adaptiveness, Eco-Friendly Procurement enhances the stability of production and logistics processes through high-quality, low-impact inputs to support predictive analytics and quality automation systems in OPERATIONAL QUALITY SYSTEMS [18].

2.3 Real-Time Delivery Adjustment:

One of the fundamental DIGITAL SUPPLY CHAIN dimensions is Real-Time Delivery Adjustment. It is the capability of logistics systems to react instantly to demand variations, supply interruptions, or operational alteration with the assistance of IoT sensors, predictive analytics, cloud computing, and automated decision-support systems [19]. Research indicates that real-time modification leads to high reliability of delivery, minimizes lead time, human error, and logistic resilience to uncertainty [20]. Real-time logistics features in digital maturity in Jordan (industrial sector) enable companies to minimize waiting time and enhance the responsiveness needed to manage the operational process and produce high quality products [2122].

2.4 Operational Quality Systems

OPERATIONAL QUALITY SYSTEMS (SOQS) enable a combination of artificial intelligence, real-time tracking, high-performance sensors, and predictive analytics to assure proactive and automatic quality management of both manufacturing and logistics processes [23]. SOQS, unlike the conventional TQM methods that aim at detecting deviations after the fact, prevent deviations at the earliest, self-correcting process parameters and operational waste before it becomes critical [24]. Studies show that SOQS lead to an increase in compliance, lower variability of production and a systematic increase in product consistency [25]. The application of such systems in the Jordanian industrial companies contributes to the shift to intelligent, data-driven quality management and the overall agenda of digital transformation [26].

2.5 Sustainablity:

SUSTAINABLITY refer to the integration of environmental, social and long-term economic factors in the procurement decision. They involve the use of suppliers with eco-certifications, green policies in procurement, packaging reduction, and transportation emissions reduction [27]. According to literature, SUSTAINABLITY have a great impact on the operational efficiency, the overall waste level, and the regulatory compliance [2829]. Notably, SUSTAINABLITY turn out to be intermediary in the connection between DIGITAL SUPPLY CHAIN and OPERATIONAL QUALITY SYSTEMS, making sure that the adaptive logistics resolutions can be translated into beneficial results facilitated by

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eco-friendly procurement [30]. Studies point to the fact that a combination of sustainable sourcing and digital logistics enhances consistency in products, defect rates, and the effects of intelligent quality systems needed in the transformation of industry in Jordan [31–32]. Such integration forms an inclusive basis of digitally empowered, sustainability minded supply chains that develop operational excellence and long-term competitiveness [3334].

Theoretical Framework and Hypothesis Development

Within the context of Technology-Organization-Environment (TOE), the paper will address the influence of key digital logistics capabilities on intelligent quality management of industrial supply chains [40]. The DIGITAL SUPPLY CHAIN is defined as the ability of the company to organize and re-plan logistics operations through the assistance of the digital technologies, and SUSTAINABLITY are positioned between the logistics Adaptiveness and the quality outcomes [41].

H1: DIGITAL SUPPLY CHAIN positively affects OPERATIONAL QUALITY SYSTEMS.

H2: DIGITAL SUPPLY CHAIN positively affects SUSTAINABLITY.

H3: SUSTAINABLITY positively affect OPERATIONAL QUALITY SYSTEMS.

H4: SUSTAINABLITY mediate the relationship between DIGITAL SUPPLY CHAIN and OPERATIONAL QUALITY SYSTEMS.

H5: Logistics process digitization positively affects digital logistics Adaptiveness.

H6: Logistics decision-making positively affects digital logistics Adaptiveness.

H7: Responsive logistics capabilities positively affect digital logistics Adaptiveness.

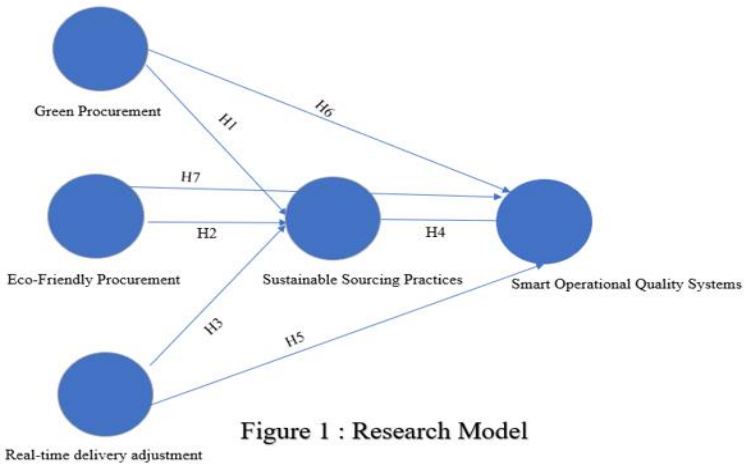

Figure 1: Conceptual model

This framework will help in studying how digital enablers and sustainability-oriented practices are converging to develop intelligent quality systems in the industrial sector in Jordan in a holistic manner [42]. The proposed hypotheses will be computed via structural

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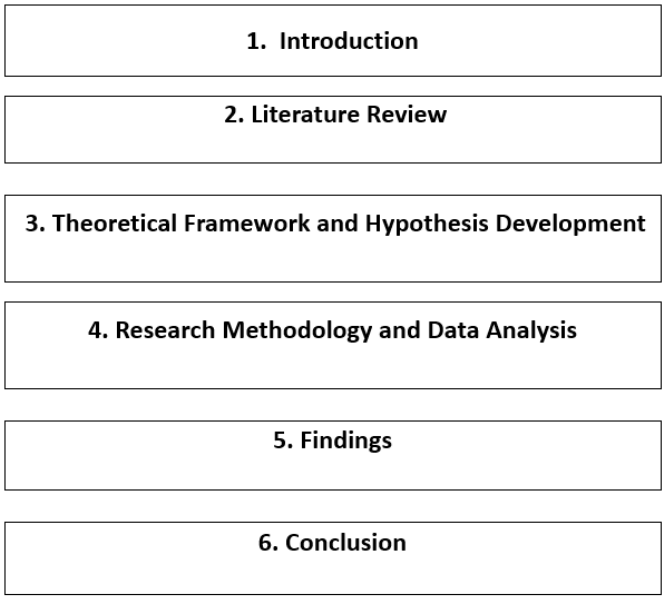
equation modeling, through which the connection between the constructs and the direct and mediated impacts on the quality performance will be addressed in an empirical way [43].

4. RESEARCH METHODOLOGY AND DATA ANALYSIS

To test the proposed relationships, a quantitative research design was used to test the association between Eco-Friendly Procurement, Green Procurement, Real-time Delivery Adjustment, SUSTAINABLITY, and OPERATIONAL QUALITY SYSTEMS. The primary data was gathered in the form of a structured survey of professionals in the industrial sector of Jordan.

An approach employed was a non-probability purposive sampling method to ensure that the respondents had the experience and competency regarding the areas of logistics, procurement and quality management. Thus, the logistics managers, procurement professionals, and quality assurance professionals were deliberately selected as a sample who have at least three years of supply chain experience [45].

Figure 2 : Research Process Flowchart



This made certain that the respondents had adequate knowledge on the digital logistics practices, procurement strategies, and sustainability programs. The data would be collected in the period between January and March 2025. The survey tool had 28 reflective indicators, which were measured based on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

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These measures tapped into the six primary constructs of the research namely Eco-Friendly Procurement, Green Procurement, Real-time Delivery Adjustment, SUSTAINABLITY, OPERATIONAL QUALITY SYSTEMS, and DIGITAL SUPPLY CHAIN dimensions that are integrated into the procurement and logistics responsiveness measures. Out of the 400 questionnaires that were distributed, 272 valid responses were received with the response rate of 68 percent. In order to alleviate the threat of common method bias, the instrument also included reverse-coded items and anonymity was also guaranteed to eliminate respondent evaluation apprehension and influence of social desirability. This methodology guaranteed high quality and objective data collected, which would be suitable to be analyzed through structural equation modeling (SEM).

4.2 Data Analysis and Model Validation

The data were analyzed using SmartPLS 4.0 and partial least squares structural equation modeling (PLS-SEM). The approach was chosen due to the theoretical nature of the conceptual model of the study and the fact that PLS-SEM works well when the sample size is medium, and the data distribution is non-normal [46]. The analysis was done in two stages. First, there was measurement model evaluation to ascertain reliability and validity.

Second, the structural model was evaluated in order to test the supposed relationships between the constructs [47]. Cronbachs alpha and composite reliability were tested and all the values were above the recommended value of 0.70, which implies high internal consistency. The average variance extracted (AVE) was used to determine convergent validity and all the constructs met the criteria of above 0.50, indicating that all sets of indicators were sufficiently tracking their latent variable. Discriminant validity was assessed using the FornellLarcker criterion and the HeterotraitMonotrait (HTMT) ratios which indicated that constructs were empirically differentiated between themselves.

All the values of variance inflation factor (VIF) were less than 3 which means that there is no multicollinearity problem. Harman single factor test also revealed that the first factor explained only 29.4 percent of the total variance which indicated that there was little common method bias. The statistical significance and stability of path coefficients was verified by bootstrapping 5,000 subsamples.

The model fit was also checked with CFI, TLI, RMSEA, and SRMR indices, and all of them fell within the recommended values, indicating that the model has reached the acceptable fit. Most of the hypotheses were supported by the model results, which indicated that Eco-Friendly Procurement, Green Procurement and Real-time Delivery Adjustment made considerable impacts on the OPERATIONAL QUALITY SYSTEMS and SUSTAINABLITY. Also, OPERATIONAL QUALITY SYSTEMS had a positive impact on SUSTAINABLITY, which strengthens its connection as a mediator in the framework.

The factor loadings are provided in Table 1 and Table 2, and all the items have a loading of above 0.70, Cronbach alpha and the composite reliability are above 0.80. Table 3 indicates that the values in the AVE are more than 0.50 which proves convergent validity and the values in HTMT ratios further validate discriminant validity. The values of both R

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2 and adjusted R 2 are reported in Table 4 which denotes moderate explanatory power of both the endogenous constructs.

On the whole, the results confirm the theoretical framework and indicate that digital Adaptiveness, sustainability-focused procurement, and smart quality systems are relevant in improving the performance of industries in Jordan.

4.2.1 Reliability and Convergent Validity

Cronbach alpha and composite reliability and average variance extracted (AVE) were used to determine the reliability and convergent validity of the constructs. As illustrated in Table 1, Cronbach alpha values were between 0.801 and 0.885, which was above the suggested value of 0.70 and established the high internal consistency of the five constructs. The values of composite reliability of 0.870 to 0.919 also indicate that the measured items are always valid in bringing out the corresponding latent variables.

The AVE values were ranging between 0.626 and 0.740 which exceeds the minimum criterion of 0.50 and constitutes evidence of convergent validity. These findings support the findings that Eco-Friendly Procurement, Green Procurement, Real-time Delivery Adjustment, OPERATIONAL QUALITY SYSTEMS and SUSTAINABLITY meet reliability and convergent validity adequately and can be analyzed further in the structural model.

Table 1: Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability	AVE
Eco-Friendly Procurement	0.816	0.879	0.645
Green Procurement	0.885	0.919	0.740
Real-time Delivery Adjustment	0.801	0.870	0.626
OPERATIONAL QUALITY SYSTEMS	0.866	0.909	0.713
SUSTAINABLITY	0.872	0.913	0.723

4.2.2 Discriminant Validity (HTMT Ratios)

Discriminant validity: To examine the discriminant validity, Heterotrait-Monomethod (HTMT) was approximated across all the latent constructs. Table 2 showed that the HTMT ranged between 0.33 and 1.062 which is greater than the threshold of 0.90. All inter-construct ratios have values that are lower than the customary cut-off value of 0.85 that demonstrates positive discriminant validity, other than the value between Logistics Decision-Making and SUSTAINABLITY (HTMT = 1.062).

The finding brings about the potential of a reduction relationship between these two traits and needs to be considered more closely. The rest of the construct pairs of Responsive Logistics Capabilities with Logistics Process Digitization (0.543) and OPERATIONAL QUALITY SYSTEMS with SUSTAINABLITY (0.335) were much below the critical value thus confirming good discriminant validity of the constructs respectively.

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Table 2: Discriminant Validity (HTMT)

No.	Variables	1	2	3	4	5
1	**Eco-Friendly Procurement**					
2	**Green Procurement**	0.34				
3	**Real-time Delivery Adjustment**	0.515	0.384			
4	**OPERATIONAL QUALITY SYSTEMS**	0.688	0.323	0.607		
5	**SUSTAINABLITY**	0.492	0.347	0.8	0.69	

4.2.3 Discriminant Validity (Fornell–Larcker Criterion)

The FornellLarcker criterion was used to identify discriminant validity. The square root of the Average Variance Extracted (AVE) are presented on the diagonal of the matrix and inter-construct correlations on the off-diagonal. The findings show that the √AVE of each construct is greater than the correlations with the other variables and this proves that the constructs are empirically different.

Eco-Friendly Procurement reported a √AVE of 0.803 which was more than the correlations between it and Green Procurement (0.29), Real-time Delivery Adjustment (0.408) and OPERATIONAL QUALITY SYSTEMS (0.583) and SUSTAINABLITY (0.415). In the same manner, Green Procurement had a higher SF of 0.860 compared to its associations with all the other constructs with a 0.293 to 0.343.

The √AVE of Real-time Delivery Adjustment was 0.791 which is higher than that of Eco-Friendly Procurement (0.408), Green Procurement (0.343), OPERATIONAL QUALITY SYSTEMS (0.51) and SUSTAINABLITY (0.682). The average variance in the OPERATIONAL QUALITY SYSTEMS was 0.844, a stronger value when compared to all its inter-construct correlations, with the greatest being 0.605 between the two items, SUSTAINABLITY.

Finally, The SUSTAINABLITY presented a 0.851 √AVE that was higher than that with all other constructs, such as Real-time Delivery Adjustment (0.682) and OPERATIONAL QUALITY SYSTEMS (0.605).

Table 3: Discriminant Validity (Fornell–Larcker Criterion)

No.	Variables	1	2	3	4	5
1	**Eco-Friendly Procurement**	0.803				
2	**Green Procurement**	0.29	0.860			
3	**Real-time Delivery Adjustment**	0.408	0.343	0.791		
4	**OPERATIONAL QUALITY SYSTEMS**	0.583	0.293	0.51	0.844	
5	**SUSTAINABLITY**	0.415	0.319	0.682	0.605	0.851

4.3.2 Explained Variance (R^2) Adjusted

Table 4: R-squared adjusted

	R-square	R-square adjusted
OPERATIONAL QUALITY SYSTEMS	0.432	0.426
SUSTAINABLITY	0.557	0.552

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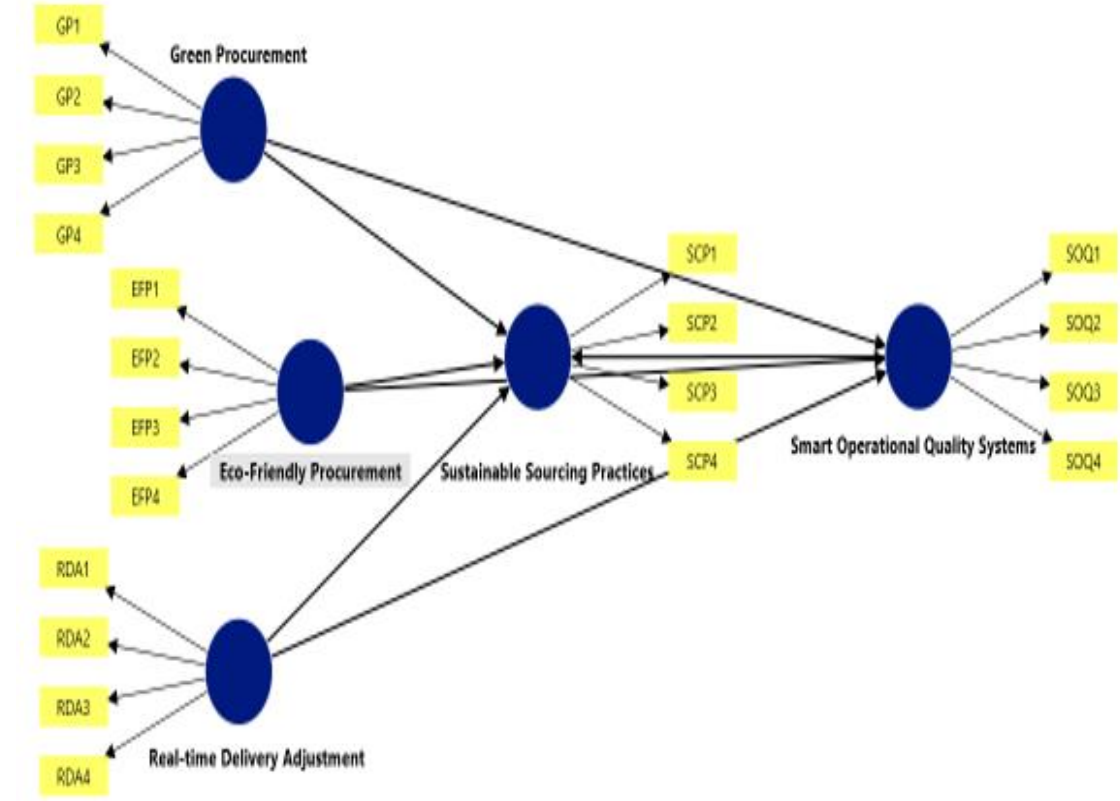

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Figure 2: Measurement Model

4.3 Structural Model

4.3.1. Structural Model Results

A bootstrapping of 5,000 subsamples was used to determine whether the structural paths in the model are significant. Table 5 result shows that the majority of the hypotheses were accepted, and some of the relationships were statistically significant. The relationship between Eco-Friendly Procurement and OPERATIONAL QUALITY SYSTEMS was positive and significant (0.439, t = 9.274, p < 0.001), which proves H1 and affirms that the practices of the environmentally oriented procurement are meaningful and help to improve the intelligent quality outcomes. Eco-Friendly Procurement further affected SUSTAINABLITY (= 0.152, = 3.408, = 0.001) slightly less but significantly, which supports H2 and at the same time demonstrates its role in sustainability-based supply chain behaviors. Conversely, the paths relating to Green Procurement did not prove to be significant. It had weak and non-significant effects on Smart Operational Quality System (= 0.059, = 1.375, = 0.169) and SUSTAINABLITY (= 0.070, = 1.446, = 0.148) which rejected H3 and H4.

It may indicate that the concept of green-oriented purchasing is conceptually applicable, but with less direct or even suboptimal immersion in the existing industrial processes in

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Jordan. Real-time Delivery Adjustment showed significant and really high effects on the two outcome variables.

Its impact on OPERATIONAL QUALITY SYSTEMS was significant (0.311, t = 7.238, p < 0.001), which supports H5, but its impact on SUSTAINABLITY was even greater (0.596, t = 12.663, p < 0.001), which supports H6. Such results suggest that real-time information-based responsive logistics modifications, which are elicited by adaptive processes, are key facilitators of intelligent quality performance, as well as sustainability-oriented sourcing.

Lastly, the role of OPERATIONAL QUALITY SYSTEMS had a large positive effect on SUSTAINABLITY (= 0.338, t = 6.540, p = 0.001), proving H7 and indicating that a more developed quality analytics and intelligent monitoring system increases the chances of firms to have SUSTAINABLITY.

In general, the findings highlight the key role of responsiveness of logistics and smart quality systems in the formation of sustainability behavior, and indicate that not all types of procurement have turned into the final results in terms of operational or sustainability practice within the contemporary industrial environment, such as Green Procurement.

Table 5: Hypotheses Test

Hypo	Relationships	Beta	Standard Error	T Statistics	P Values	Decision
H1	Eco-Friendly Procurement -> OPERATIONAL QUALITY SYSTEMS	0.439	0.047	9.274	0	Supported
H2	Eco-Friendly Procurement -> SUSTAINABLITY	0.152	0.045	3.408	0.001	Supported
H3	Green Procurement -> OPERATIONAL QUALITY SYSTEMS	0.059	0.043	1.375	0.169	Unsupported
H4	Green Procurement -> SUSTAINABLITY	0.07	0.048	1.446	0.148	Unsupported
H5	Real-time Delivery Adjustment -> OPERATIONAL QUALITY SYSTEMS	0.311	0.043	7.238	0	Supported
H6	Real-time Delivery Adjustment -> SUSTAINABLITY	0.596	0.047	12.663	0	Supported
H7	OPERATIONAL QUALITY SYSTEMS -> SUSTAINABLITY	0.338	0.052	6.54	0	Supported

The evaluation of 5,000 subsamples of bootstrapping was carried out to determine the significance of the structural paths in the model. According to Table 5, the majority of hypotheses were accepted with some of the relationships showing high levels of statistical significance. The transition between Eco-Friendly Procurement and OPERATIONAL QUALITY SYSTEMS was not only positive but also significant (= 0.439, t = 9.274, p = 0.001), which confirms H1 and proves the fact that the environmentally oriented procurement practices do have a significant meaning and influence on smart quality results. The other significant albeit lesser impact was on SUSTAINABLITY which was influenced by Eco-Friendly Procurement (= 0.152, t = 3.408, p = 0.001), which supported H2 and revealed its input in sustainability-oriented behaviors in supply chain. On the

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contrary, the paths related to Green Procurement were not significant. Its impact on OPERATIONAL QUALITY SYSTEMS (= 0.059, = 1.375, = 0.169) and SUSTAINABLITY (= 0.070, = 1.446, = 0.148) were both weak and non-significant which rejected H3 and H4. This implies that despite the conceptual relevance of green-oriented purchasing, a more direct impact on it or a lack of integration into existing industry practice in Jordan may be a problem. There was a great and very important effect of Real-time Delivery Adjustment on both outcome variables. It had a significant effect on OPERATIONAL QUALITY SYSTEMS ($\beta = 0.311$, $t = 7.238$, $p < 0.001$), which confirmed the H5, and strong impact on SUSTAINABLITY ($\beta = 0.596$, $t = 12.663$, $p < 0.001$), which supported H6. These results suggest that real-time data-driven, adaptive processes that lead to responsive logistics changes are both the key drivers of intelligent quality performance and sustainability-focused sourcing. Lastly, a positive effect on the SUSTAINABLITY (0.338, $t = 6.540$, $p < 0.001$) was significant and supported H7, indicating that more successful quality analytics and intelligent monitoring systems are also associated with SUSTAINABLITY. All in all, the findings highlight the primary importance of logistics responsiveness and smart quality systems in the development of sustainability behavior, and demonstrate that certain types of procurement, specifically Green Procurement, are yet to be transformed into tangible operational or sustainability performance in the existing industrial environment.

5. FINDINGS

5.1 Discussion of Results

The results of the structural model give a good indication of the way procurement practices and logistics responsiveness determine OPERATIONAL QUALITY SYSTEMS and SUSTAINABLITY in Jordanian industrial supply chains. The results of bootstrapping indicate that Eco-Friendly Procurement has a strong positive impact on OPERATIONAL QUALITY SYSTEMS (0.439, t=9.274, p=0.001) and a positive effect on SUSTAINABLITY (0.152, t=3.408, p=0.001). These results help to support the idea that environmentally oriented procurement does have a significant input on both intelligent quality performance and sustainability results. Conversely, the relationship between Green Procurement and OPERATIONAL QUALITY SYSTEMS (0.059 1.375 0.169) and SUSTAINABLITY (0.070 1.446 0.148) were not statistically significant. This implies that green procurement projects might be present, but they are currently not deeply incorporated in the industrial activities of the Jordanian setting to produce any quantifiable difference in the digital quality or sustainability performance. One of the strongest predictors of the model proved to be Real-time Delivery Adjustment. It had a much stronger influence on OPERATIONAL QUALITY SYSTEMS (0.311 = -0.001) and a stronger impact on SUSTAINABLITY (0.596 = 12.663 = 0.001). It means that both sustainability-oriented sourcing and quality excellence are based on the idea of logistics responsiveness that can be achieved by means of real-time analytics and tracking, as well as digital coordination.

Lastly, OPERATIONAL QUALITY SYSTEMS had a positive impact on the SUSTAINABLITY (= 0.338, = 6.540, = 0.001), which confirms that companies with more

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developed intelligent quality systems have a higher chance of institutionalizing sustainability-oriented procurement activities. The interdependence between digital quality capabilities and sustainable supply chain practices should be emphasized in this relationship. All these findings outline the fact that responsiveness and environmentally conscious procurement are more effective drivers of both quality and sustainability results as compared to traditional green procurement practices which might still be at their infancy stages in Jordanian industrial corporate landscape.

5.2 Theoretical Implications

The results support the applicability of the Technology Organization Environment (TOE) framework in that digital preparedness and responsive logistics capabilities are core in the determination of sustainable sourcing and intelligent quality outcomes. The high correlations found among real-time delivery adjustment, sustainable procurement, and quality performance emphasize DIGITAL SUPPLY CHAIN as a dynamic capability and this corresponds to the modern theory of reconfiguring resources and strategic capability [51]. Moreover, the work provides a conceptual contribution as it empirically combines sustainability-oriented sourcing with digital quality management and applies TOE theory to the sphere of the environmentally friendly digital logistics. As depicted in the model, SUSTAINABLITY are not merely an activity, but an intervening process through which the advantages of digital Adaptiveness could be directed to quality performance in an organization.

5.3 Managerial Implications

The results have a number of valuable managerial implications on industrial companies. Digital transformation becomes one of the main sources of quality improvement because investments in real-time logistics analytics, automated decision-support systems, adaptive delivery systems directly reinforce OPERATIONAL QUALITY SYSTEMS. Simultaneously, sustainability should be actively incorporated into the quality management process, and SUSTAINABLITY should be implemented into procurement operations, vendor assessments, and sourcing processes and structures to strengthen environmental responsibility and operational stability. The benefits of Eco-Friendly Procurement are also evident, since the company will focus on the low-emission suppliers, materials that can be recycled, and those that are certified by the environmental standards, which helps achieve higher quality results and better sustainability performance. Nevertheless, the responsiveness of logistics, although necessary, is not enough in itself; the adaptivity of deliveries should be supported by the sustainability-oriented procurement process, and the intelligent quality systems to produce significant changes in performance. Industrial companies are being urged strategically to implement AI-powered and automated logistics to increase responsiveness, introduce supplier sustainability scoring systems and environmental auditing to reinforce sustainable sourcing and invest in digital infrastructure to enable predictive analytics, smart quality monitoring, and data-driven procurement. On a bigger scale, these can be supported by government and policy-makers by encouraging development of digital infrastructure, developing e-procurement programmes, facilitating public-private collaborations that can

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hasten uptake of eco-friendly logistics within SMEs, and by developing regulations or incentives that reward sustainability and adoption of digital. Technology providers also have a major role to play because they develop interoperable digital logistics platforms that are modular and have built-in sustainability measures as well as providing industry-specific tools that allow firms to monitor, measure, and enhance their environmental performance in sourcing.

5.5 Limitations and Future Research

The study has a number of limitations, even though it contributed. The attention to the Jordanian industry limits the generalization to other industries or countries. The model should be applied to other industries like healthcare, retail and agricultural industries in future studies.

A cross-sectional design restricts knowledge on the effects of digital transformation over time; longitudinal research is advisable to help capture the changes of sustainability and quality plans over time. Other mediators' regulatory compliance, digital culture or environmental orientation- might be considered to increase the explanatory power of the structural model.

5.6 Research Implications

1) The research establishes new directions of the introduction of the combination of green and digital practices in improving the quality performance. As it is emphasized in the validated model, digital Adaptiveness in itself is not enough; it should be supplemented with the sustainability-based procurement to achieve the overall benefits of the operational potential.
2) The results add to the body of academic literature by showing how sustainability and digital transformation overlap, and they provide practitioners with a guideline on how to raise the quality and sourcing choices.

6. CONCLUSION

The paper indicates that DIGITAL SUPPLY CHAIN has turned out to be a mandatory tool in the contemporary supply chains that are committed to remain responsive, competitive, and environmentally responsible. An environmentally friendly procurement and on-site delivery modification are the key to benefitting OPERATIONAL QUALITY SYSTEMS and developing a sourcing behavior that is sourcing sustainable. SUSTAINABLITY informed by the use of digital data, environmental consciousness, and supplier analysis are a key driver that attaches responsiveness of logistics to long-term operation excellence and resilience. Finally, the findings demonstrate that the digital responsiveness, intelligent quality systems, and sustainable sourcing are not single projects, but pillars of the next-generation supply chain management. In the case of Jordanian industries, digital Adaptiveness and sustainability-oriented procurement is a strategic direction toward a better quality, greater environmental results, and increased competitiveness on the international markets.

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