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ACHIEVING FIRM FINANCIAL PERFORMANCE THROUGH THE JUST-IN-TIME SUPPLY CHAIN, QUALITY MANAGEMENT, AND SUPPLY CHAIN INTEGRATION: THE MODERATING ROLE OF IT ADVANCEMENT

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Abstract: *Global competition and uncertainties call for manufacturers to adopt advanced supply chain practices that help them achieve competitive advantages in a volatile business environment. In this essence, the current research examines how supply chain integration, just-in-time practice, and quality management boost a firm operational and financial performance during a pandemic crisis like COVID-19. Similarly, this study examines the moderating effect of IT advancement on the relationship between a firm operational and financial performance. The sample size of this study is assessed with a priori power analysis. Data were collected from employees working in manufacturing firms, including construction equipment, transportation, electronic products, engineering, chemical, pharmaceutical, and healthcare manufacturers. For empirical analysis, 380 responses were estimated with a structural equation modeling approach. Constructs validity and reliability are tested in the measurement model. Empirical findings revealed that factors such as internal integration, process integration, product integration, just-in-time, and quality management collectively explained* R^2 *75.4 % variance in firm operational performance. In addition, effect size analysis* f^2 *shows that product integration has the highest importance in determining a firm operational performance. The research model has shown substantial predictive power* Q^2 *54.2% to predict firm operational performance. The moderating impact of IT advancement is established and revealed that IT advancement in the supply chain will strengthen the relationship between the firm's operational and financial performance. Theoretically, this research has developed an integrated supply chain model that combines supply chain integration factors, just-in-time, quality management, and IT advancement to investigate the firm's operational performance. To practice, this study suggests that policymakers should concentrate on process integration, just-in-time supply chain strategy, and IT advancement, which boosts the firm's operational and financial performance. This study is unique as it discloses several useful findings which would help manufacturers deal with an unprecedented situation like the COVID-19 pandemic.*
Keywords: empirical findings, internal integration, operational performance, process integration, product integration.
JEL Classification: R41, F15, F36

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Introduction. The role of supply chain integration in achieving organizational performance has been identified as the novel (Huo et al., 2014; Siagian et al., 2021). However, the implementation of supply chain integration is complicated due to high uncertainty (He et al., 2017). The supply chain integration process becomes more challenging when it deals with just-in-time supply chain practices (Jiang et al., 2022; Yang et al., 2021). Although just-in-time benefits firms by reducing inventory costs, shortening lead time, improving quality, and boosting customer satisfaction, it increases the risk of inventory write-offs or stock (Heizer, 2016; Yang et al., 2021). Therefore, a careful investigation is required to understand how different supply chain practices impact firm performance (Bandoophanit and Pumprasert, 2022; Sharma et al., 2022; Yang et al., 2021). A recent study by Siagian et al. (2021) has shown the positive impact of supply chain integration in measuring supply chain resilience and business performance during the COVID-19 pandemic. However, the firm's operational and financial performance is paid less attention to. Therefore, the current research investigates firm operational and financial performance that has been ignored in prior studies (Ayoub et al., 2017). According to Ayoub et al. (2017), literature has established a strong relationship between supply chain integration and overall organizational performance. However, the firm's operational and financial performance has not been addressed sufficiently. The current study fills the research gap in this context and develops an amalgamated research model underpinned advance supply chain practices to investigate the firm's operational and financial performance.

The research model (Fig 1) comprises factors, namely product integration, process integration, internal integration, quality management, just-in-time, and IT advancement, to investigate the firm's operational and financial performance. In supply chain operations, product integration denotes a process wherein firms engage all stakeholders in product development and create close interaction with external stakeholders (Huo et al., 2014). Therefore, process integration is identified as creating coordination and synchronizing processes with external parties, including customers and suppliers. Internal supply chain integration is seen as a process in which manufacturer design strategies for their own organizational practices and process and synchronizes process and practices to gain customer satisfaction (Siagian et al., 2021). Similarly, just in time supply chain strategy is seen as the extent wherein a product or material reaches the right place, right time with the right quantity (Heizer, 2016) and benefits organizations by decreasing time and inventory costs but improving product quality and response time which in result boost customer satisfaction (Yang et al., 2021). Concerning quality management factors, authors like Jyoti et al. (2017) have established that quality management is an essential factor for sustainable SC operations resulting in an increased firm profit. This research adds insight into supply chain literature by adding the moderating effect of IT advancement between firm operational and financial performance. Thus, the integrative supply chain model reveals useful findings for the manufacturer to improve the firm's operational and financial performance. The relationship between predictor and criterion factors is conceptualized in the following section.

Literature Review. Supply chain integration (SCI) is defined as a strategic process of coordinating with stakeholders and supply chain partners and managing intra- and inter-supply chain processes (Huo et al., 2014). SCI is conceptualized in earlier literature as internal and external integration (Ayoub et al., 2017; Flynn et al., 2010; Huo et al., 2014; Schoenherr & Swink, 2012). Internal supply chain integration is seen as a process in which manufacturers design strategies for their own organizational practices and processes and synchronize processes and practices to gain customer satisfaction. Therefore, external integration is the degree to wherein firms collaborate with external supply chain partners, develop inter-organization strategies, and synchronize practices and processes (Flynn et al., 2010). However, external integration is not limited to a single factor. Huo et al. (2014) classified external SCI into process and product integration. Process integration denotes coordination and synchronizing processes with external parties, including customers and suppliers. Therefore, product integration is the process wherein firms engage all stakeholders in product development and create close interaction with external stakeholders.

Literature has confirmed that in the SCI integration context, both product and process integration have significantly impacted operational performance (Ayoub et al., 2017; Brakman et al., 2020; Huo et al., 2014; Schoenherr and Swink, 2012). For instance, Ayoub et al. (2017) postulated that internal integration allows the manufacturer to jointly design products, reduce duplication tasks and ensure product quality in a supply chain process. On the other side, the external integration process can help the manufacturer to improve production planning with external parties coordination, decrease stock obsolescence, and fast product delivery process (Schoenherr and Swink, 2012; Swink and Song, 2007). Earlier studies have confirmed the significant influence of SCI on a manufacturing firm's operational performance (Ataseven and Nair, 2017; Ayoub et al., 2017; Huo et al., 2014; Schoenherr and Swink, 2012; Vanpoucke et al., 2017). Therefore, the researcher proposes the first set of hypotheses:

H1: Internal supply chain integration positively relates to operational performance.

H2: Process supply chain integration positively relates to operational performance.

H3: Product supply chain integration positively relates to operational performance.

A just-in-time supply chain strategy is the extent to which a product or material reaches the right place, the right time with the right quantity and quality (Heizer, 2016). The just-in-time (JIT) supply chain strategy benefits organizations by decreasing time and inventory costs but improving product quality and response time, ultimately boosting customer satisfaction (Yang et al., 2021). Prior researchers indicate that JIT practices have an influential impact on achieving a firm's competitive advantages, customer satisfaction, and responsiveness (Chung et al., 2018; Inman et al., 2011; Mackelprang and Nair, 2010; Tseng et al., 2019; Yang et al., 2021; Yao and Hsu, 2018). However, introducing a just-in-time supply chain strategy in firms is critical because stock out or inventory write-offs may cause dissatisfaction.

It is found that firms largely rely on suppliers following the JIT approach. Thus, strong coordination is required between firms and suppliers (Inman et al., 2011). Meanwhile, firms should be capable of forecasting customer demands to respond timely and handle dynamic marketplace changes (Heizer, 2016). According to Inman et al. (2011), supply chain synchronization enhances a firm's operational performance. For instance, when firms synchronize production and delivery information, it affects operational efficiency in a supply chain (Inman et al., 2011). Literature has revealed that just-in-time practices such as logistics, production planning, and sourcing positively impact a firm's operational and financial performance (Inman et al., 2011; Mackelprang and Nair, 2010; Oliveira and Handfield, 2019). Therefore, just-in-time practice in the supply chain is hypothesized as follows:

H4: JIT practice positively relates to firm operational performance.

Quality management has indicated a substantial impact firm's operational performance (Al-Dhaafri and Al-Swidi, 2016). Earlier studies have established that quality management in the supply chain process enhances customer satisfaction, builds customer loyalty, and increases firm profitability (Al-Dhaafri and Al-Swidi, 2016; Jyoti et al., 2017; Raja et al., 2011; Yamin and Mahasneh, 2018). According to Jyoti et al. (2017), quality management is an essential factor for sustainable improvement resulting increase in firm profit. In the context of developing countries, Bienhaus and Haddud (2018) asserted that quality management directly influences manufacturers' operational and business performance. Therefore, attention should be paid to improving the quality of the products. A recent study by Green et al. (2019) conceptualized a complementary relationship among just-in-time practice, quality management, operational performance, and green supply chain practices in USA-based manufacturing firms. In addition, authors like Feng et al. (2018) have confirmed the significant effect of quality management in measuring a firm operational and financial performance. Following the above arguments and supported by earlier studies conducted by Feng et al. (2018); Green et al. (2019); Jyoti et al. (2017); Raja et al. (2011), quality management is hypothesized as follows:

H5: Quality management positively relates to operational performance.

IT advancement

IT is becoming an integral part of firm operational activities due to the rapid development of information technology. The operational and financial performance of the firm is interlinked with technology. It is also eminent that IT use and advancement in the supply chain process enhance a firm operational and financial performance. The term IT advancement is the degree to wherein a firm adopts sophisticated technology in production and process and offers solutions to customers proactively (Bader and Mohammad, 2019; Tigga et al., 2021; Wu et al., 2006). IT advancement benefits manufacturing firms in several ways. For instance, the use of technology helps manufacturers and suppliers to share information quickly. By implementing IT technologies, manufacturers can achieve better coordination between parties and reduce transactional and operational costs (Rahi et al., 2021a; Tippins and Sohi, 2003). IT advancement has become an essential component that brings accuracy to operations. Therefore, it should be embedded in the supply chain process (Barney et al., 2001; Ivanov et al., 2019; Rahi et al., 2021b; Taylor, 2003; Tippins and Sohi, 2003). Ayoub et al. (2017) have shown a positive relationship between IT advancement, firm operational performance, and financial performance. Following the above arguments, the current research studied the moderating effect of IT advancement between firm operational and financial performance. Thus, the following hypotheses are proposed:

H6: Firm operational performance positively relates to financial performance.

H7: IT advancement has a moderating impact on the relationship between operational performance and firm financial performance.

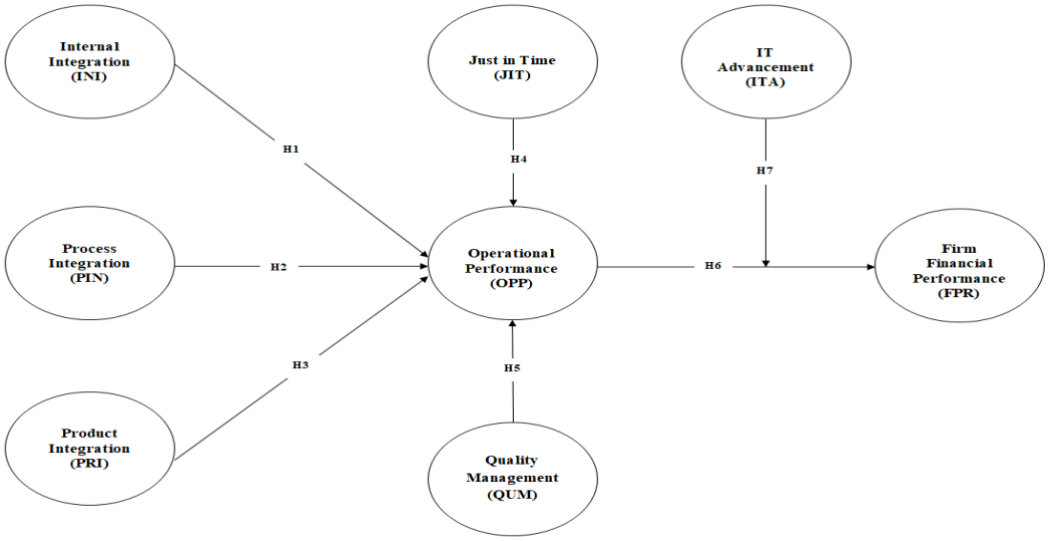

Figure 1. The research framework

Sources: developed by the authors.

Methodology and research methods. Measurement development.The scale development process is consistent with prior studies by Samar Rahi (2017a) and Churchill Jr (1979). Following guidelines provided by Samar Rahi (2017b), initially, a careful literature review was conducted to define outlined constructs. Therefore, relevant literature was linked with constructs to develop scale in the second stage. Nevertheless, all constructs items were adopted and adapted into the supply chain integration context. The scale items for just-in-time and quality management were adopted from Agyabeng-Mensah et al. (2021). Therefore, instrument items for internal integration were adopted from Chen and Paulraj (2004) and Huo et al. (2014). Next to this process integration and product nitration were measured with scale items adopted from Huo et al. (2014) and Flynn et al. (2010). Similarly, scale items for operational performance and financial performance were adapted from Kathuria (2000), Agyabeng-Mensah et al. (2021), and Wu et al. (2006). Wu et al. (2006) adopted scale items for the IT advancement construct. Scale items are measured with a Likert scale indicating 1 for strongly disagree and 7 for strongly agree, consistent with prior studies (Churchill Jr, 1979; Rahi, 2017b). Table 1 depicts the composite reliability and convergent validity of the scale items.

Research design, sampling, and data collection. Since this study attempts to gain insight into how supply chain practices, including supply chain integration, quality, and just-in-time approach, enrich the manufacturing firms' operational and financial performance, a positivist research paradigm has been selected to design this research. The positivist research paradigm warrants testing causal relationships through a quantitative research method (Ngah et al., 2021; Yamin, 2020a). Literature has substantial support to test the causal relationship between exogenous and endogenous factors using empirical analysis. Hence, this study opted for the quantitative research method (Ngah et al., 2021; Rahi, 2017b; Rahi et al., 2018; Yamin & Alyoubi, 2020). The survey questionnaire was developed with a combination of scale items and the demographic characteristics of the respondents. Therefore, the sample size of this research is selected with prior power analysis and consistent with earlier studies (Cohen, 1988; Rahi, et al., 2021b; Yamin and Sweiss, 2020). The G-power analysis suggests calculating eight constructs. The sample size should be $\geq$ 240, representing an adequate sample size. Nonetheless, the research target is to retain maximum responses, as suggested by Rahi (2017a) postulated that a greater sample size would reduce the chances of sampling error.

As illustrated in the literature, the center of this research is to investigate how manufacturing companies increase operational and financial performance. The consistent with the population of this study comprises manufacturing firms operating in Saudi Arabia. According to Agyabeng-Mensah et al. (2021), manufacturing firms incorporate the complete flow of the supply chain in operations and hence are considered the unit of analysis in this research. The research survey was conducted on manufacturing firms, including construction equipment, transportation, electronic products, engineering, chemical, pharmaceutical, and healthcare manufacturers. The research survey is administered online using the email addresses of managers and subordinates. Initially, respondents were approached through phone calls, and after their consent research questionnaire was sent directly to their email addresses. This research is piloted during the COVID-19 pandemic. Therefore, the online mode has been selected for a research survey that mitigates physical contact

and prevents the spread of the virus. Overall, 650 respondents were approached using a convenience sampling approach consistent with Rowley (2014) and Rahi (2017b). Among them, 393 questionnaires returned with a response rate of 60%. These questionnaires were further examined, and 13 were discarded due to inadequate filling. Therefore, 380 responses were tested for empirical analysis to disclose the influence of the integrated supply chain model on the firm's operation and financial performance.

Common method bias. In this research, data is collected using a single source. Therefore, common method variance bias could arise. According to Podsakoff and Organ (1986), research that uses single sources may affect common method variance bias. Thus, the CMV-B issue must be examined carefully. The common method variance bias has been tested using procedural and statistical remedies (Podsakoff and Organ, 1986; Rahi, 2017b). In statistical remedies, Harman's single-factor solution analysis is employed. This analysis advocates that variance explained by the first un-rotated factor should not be greater than 40% (Cohen, 1988; Rahi, 2017a; Yamin, 2019). Results of Harman's single-factor solution revealed that the maximum variance explained by the first factors was 21% and substantially less than the threshold value of 40%. Additionally, this study has incorporated procedural remedies to mitigate CMV-B. In procedural remedies surveys, questionnaires were jumbled up before data collection (Podsakoff et al., 2003). These measures established that CMV-B is not a potential concern.

Data analysis and results. The current research has analyzed data with a structural equation modeling approach (SEM). The structural equation modeling approach estimates data with measurement and structural models (Rahi et al., 2018). There are two main approaches to SEM estimation. The first is the partial least square approach (PLS-SEM), and the second is the co-variance-based (CB-SEM) approach (Rahi et al., 2018). This study emphasizes theory development. Therefore, the partial least square approach (PLS-SEM) is suitable for data analysis. The Smart-PLS software has been used for data analysis (Ringle et al., 2015).

Measurement model. In the measurement model, indicator reliability constructs reliability and discriminant. The convergent validity of the constructs is verified. To achieve construct validity, the values of the Cronbach alpha (α) and composite reliability (CR) were assessed following a threshold value ≥ 0.70 as recommended by Rahi et al. (2019a). Nevertheless, convergent validity is confirmed following the threshold value of average variance extracted ≥ 0.50, as Rahi et al. (2018) suggested. Similarly, indicator reliability is confirmed following the method that loading should be ≥ 0.60 as recommended by (Ngah et al., 2021; Rahi et al., 2018; Yamin and Sweiss, 2020). Table 1 shows the results of the measurement model.

Table 1. Measurement model

Instrument/Items	Loadings	CA	CR	AVE
FPR1: Our firm has a better return on investment when compared with competitors.	0.941	0.894	0.934	0.826
FPR2: Our firm has a better return on sale when compared with competitors.	0.874			
FPR3: Our firm has substantial market share growth compared to competitors.	0.910			
INI1: Following internal integration practices, this firm integrates data for an internal function.	0.867	0.881	0.927	0.808
INI2: This firm uses enterprise applications to integrate the firm internal functions.	0.929			
INI3: This firm uses real-time integration to manage all functions, from raw material to end product.	0.899			
ITA1: Our firm uses advanced IT applications for managing supply chain operations.	0.816	0.798	0.882	0.713
ITA2: Our firm uses state-of-the-art technology to manage supply chain operations.	0.834			
ITA3: The use of advanced IT applications gives a competitive advantage to our firm over the industry.	0.882			
JIT1: The just-in-time strategy reduce lot size in our plant and improve operational performance.	0.914	0.899	0.930	0.768
JIT2: The just-in-time applications reduce time in setting equipment in our firm.	0.855			
JIT3: The just-in-time strategy completely controls the pull system of production.	0.865			
JIT4: The just-in-time applications mitigate the chances of machine breakdown and production stoppage.	0.871			

Continued Table 1

Instrument/Items	Loadings	CA	CR	AVE
OPP1: The product delivery speed is excellent among supply chain partners and end customers.	0.858	0.856	0.912	0.776
OPP2: This firm has flexibility in product development, volume, and product mix.	0.891			
OPP3: This firm is responsive in pre-and post-sale customer services.	0.893			
PIN1: Our firm has a strong inter-organizational process with supply chain stakeholders.	0.807	0.920	0.944	0.809
PIN2: Our firm works deeply with supply chain stakeholders to create strong trust.	0.955			
PIN3: Our firm has established a strong customer relationship to improve inter-organizational processes.	0.935			
PIN4: This firm has established a solid inter-organizational relationship with the help of information technology.	0.894			
PRI1: In an integrative supply chain model, this firm updates stakeholders about new product development.	0.976	0.968	0.979	0.941
PRI2: This firm involves suppliers in the new product development stage in the integrative supply chain model.	0.958			
PRI3: In this firm product integration process involves customers at the initial development stage of the product.	0.975			
QUM1: This firm keeps close customer relationships to maintain quality and delivery performance.	0.912	0.890	0.923	0.750
QUM2: This firm encourages customers to give feedback to improve quality and delivery performance.	0.838			
QUM3: This firm designs high-quality products with minimum part counts.	0.941			
QUM4: This firm designs high-quality products based on customer needs.	0.762			

Note: CA – Cronbach Alpha (α); CR – Composite Reliability = (Σλ)2 /(Σλ)2+ Σe; AVE – Average Variance Extracted =Σλ2 / Σλ2+Σe and e=1- λ2;2/df – Chi-Square Test Statistic /Degrees of Freedom.

Sources: developed by the authors.

The result of the measurement model has shown adequate construct reliability and discriminant and convergent validity of the constructs. However, FPR4 was deleted due to lower indicator loading. Next, the discriminant validity of the research model is tested with Fornell and Larcker analysis (Fornell and Larcker, 1981; Yamin, 2020b). According to Fornell and Larcker (1981), discriminant validity, in fact, reveals how indicators vary and measure distinct concepts. The Fornell and Larcker analysis achieved discriminant validity using average variance extracted values following the criterion that the square root of AVE must be higher than the correlation of corresponding constructs (Fornell and Larcker, 1981). Table 2 shows the findings of the Fornell and Larcker analysis. It demonstrates the adequate discriminant validity of the measure.

Table 2. Fornell and Larcker's analysis

Indicator	FPR	INI	ITA	JIT	OPP	PIN	PRI	QUM
FPR	*0.909*							
INI	0.214	*0.899*						
ITA	0.133	0.017	*0.844*					
JIT	0.357	0.294	0.056	*0.877*				
OPP	0.405	0.458	-0.020	0.658	*0.881*			
PIN	0.212	0.182	-0.104	0.376	0.436	*0.900*		
PRI	0.281	0.323	-0.019	0.517	0.776	0.280	*0.970*	
QUM	0.317	0.273	0.053	0.453	0.466	0.257	0.296	*0.866*

Note: FPR-Firm Financial Performance; INI-Internal integration; ITA-IT advancement; JIT-Just in time; OPP-Operational Performance; PIN-Process integration; PRI-Product integration; QUM-Quality management.

Sources: developed by the authors.

Discriminant validity was tested through cross-loading analysis (Ngah et al., 2021). According to Fornell and Larcker (1981), cross-loading is an alternative method to test the discriminant validity of the measure and should be employed in data analysis. The cross-loading analysis recommends that the loading of indicators must be higher than the loadings of the other constructs demonstrating construct is discriminant (Fornell and

Larcker, 1981). Results revealed satisfactory discriminant validity as an indicator of the construct was higher than other constructs indicating, hence establishing adequate discriminant validity of the constructs. Table 3 exhibits the indicator loadings.

Table 3. Cross-loadings analysis

Indicator	FPR	INI	ITA	JIT	OPP	PIN	PRI	QUM
FPR1	*0.941*	0.188	0.112	0.322	0.350	0.154	0.254	0.244
FPR2	*0.874*	0.213	0.108	0.368	0.417	0.285	0.258	0.376
FPR3	*0.910*	0.179	0.145	0.276	0.329	0.129	0.252	0.232
INI1	0.208	*0.867*	0.035	0.271	0.415	0.134	0.329	0.284
INI2	0.181	*0.929*	0.010	0.273	0.422	0.187	0.279	0.238
INI3	0.189	*0.899*	-0.001	0.250	0.398	0.169	0.261	0.211
ITA1	0.116	0.017	*0.816*	0.051	-0.030	-0.092	-0.022	0.031
ITA2	0.105	0.010	*0.834*	0.065	0.020	-0.094	0.023	0.058
ITA3	0.115	0.015	*0.882*	0.028	-0.036	-0.077	-0.045	0.046
JIT1	0.275	0.224	0.029	*0.914*	0.587	0.309	0.607	0.332
JIT2	0.383	0.287	0.069	*0.855*	0.591	0.390	0.320	0.495
JIT3	0.363	0.347	0.053	*0.865*	0.591	0.312	0.351	0.475
JIT4	0.222	0.164	0.046	*0.871*	0.533	0.305	0.545	0.272
OPP1	0.269	0.332	-0.035	0.581	*0.858*	0.335	0.913	0.318
OPP2	0.435	0.413	0.014	0.560	*0.891*	0.440	0.545	0.472
OPP3	0.374	0.472	-0.029	0.597	*0.893*	0.381	0.562	0.451
PIN1	0.127	0.161	-0.093	0.352	0.377	*0.807*	0.374	0.140
PIN2	0.228	0.156	-0.091	0.347	0.434	*0.955*	0.228	0.287
PIN3	0.227	0.184	-0.091	0.343	0.414	*0.935*	0.240	0.262
PIN4	0.173	0.152	-0.099	0.308	0.330	*0.894*	0.162	0.227
PRI1	0.283	0.306	-0.018	0.536	0.757	0.286	*0.976*	0.299
PRI2	0.270	0.315	-0.028	0.478	0.754	0.266	*0.958*	0.294
PRI3	0.265	0.319	-0.009	0.490	0.746	0.264	*0.975*	0.269
QUM1	0.280	0.201	0.063	0.382	0.395	0.224	0.245	*0.912*
QUM2	0.278	0.327	0.045	0.473	0.492	0.225	0.354	*0.838*
QUM3	0.293	0.231	0.049	0.388	0.410	0.270	0.229	*0.941*
QUM4	0.238	0.130	0.019	0.272	0.247	0.148	0.136	*0.762*

Note: FPR-Firm Financial Performance; INI-Internal integration; ITA-IT advancement; JIT-Just in time; OPP-Operational Performance; PIN-Process integration; PRI-Product integration; QUM-Quality management.

Sources: developed by the authors.

The measurement model ensures the discriminant validity of the construct. Therefore, the Heterotrait-Monotrait ratio method (HTMT) was employed to establish the discriminant validity of the measure (Gold et al., 2001; Rahi et al., 2021a; Sweiss and Yamin, 2020; Yamin, 2020b). Kline (2011) presented the HTMT method. It suggests that the HTMT ratio must not be higher ≤0.85 to achieve discriminant validity of the constructs. Nevertheless, authors like Gold et al. (2001) suggested threshold value ≤ 0.90 indicates satisfactory discriminant validity. PLS algorithm had shown that HTMT values were less than ≤0.85, confirming adequate discriminant validity of the construct. Table 4 exhibits the results of the HTMT ratio analysis.

Table 4. Heterotrait-Monotrait Criterion

	FPR	INI	ITA	JIT	OPP	PIN	PRI	QUM
FPR								
INI	0.240							
ITA	0.158	0.029						
JIT	0.392	0.327	0.067					
OPP	0.463	0.530	0.045	0.748				
PIN	0.227	0.202	0.122	0.412	0.490			
PRI	0.302	0.349	0.041	0.557	0.840	0.296		
QUM	0.347	0.289	0.061	0.484	0.514	0.274	0.300	

Note: FPR-Firm Financial Performance; INI-Internal integration; ITA-IT advancement; JIT-Just in time; OPP-Operational Performance; PIN-Process integration; PRI-Product integration; QUM-Quality management.

Sources: developed by the authors.

Structural model assessment. After confirming constructs, the researchers tested the reliability and validity outlined path through the structural model. The structural model assessment comprises the estimation of the path with path coefficient, t-statistics, significance, and coefficient of determination (Hair et al., 2015; Rahi et al., 2021a). To produce results, data were bootstrapped with dummy data set of 3000 consistent with prior studies (Hair et al., 2015; Rahi et al., 2019a; Yamin, 2020b). Table 5 shows the results of the hypotheses testing.

Table 5. Hypotheses testing

Hypothesis	Relationship	Path Coefficient	STDEV	T-Statistics	Significance	Decision
H1	INI -> OPP	0.160	0.035	4.609	0.000	Accepted
H2	PIN -> OPP	0.141	0.035	4.050	0.000	Accepted
H3	PRI -> OPP	0.530	0.052	10.226	0.000	Accepted
H4	JIT -> OPP	0.227	0.048	4.767	0.000	Accepted
H5	QUM -> OPP	0.127	0.036	3.529	0.000	Accepted
H6	OPP -> FPR	0.408	0.062	6.555	0.000	Accepted

Note: STDEV – Standard Deviation.
Sources: developed by the authors.

Structural model estimation presented that internal integration significantly impacts firm operational performance in supply chain flow and statistically confirmed by H1: β = 0.160 path, significance p < .001 and t-statistics 4.609. Therefore, process integration has positively impacted firm operational performance and is statistically confirmed by H2: β = 0.141 path, significance p < .001, and t-statistics 4.050. Similarly, the relationship between product integration and firm operational performance is found positive and supported by H3: β = 0.530 path, significance p < .001, and t-statistics 10.226. These findings revealed that integrated factors have a significant and positive influence in predicting firm operational performance. Concerning with just in time and quality management, findings of the structural model have confirmed the positive impact of both factors on a firm operational performance and are statistically supported by β = 0.227 path, significance p<.001 and t-statistics 4.767; β = 0.127 path, significance p < .001 and t-statistics 3.529 and hence confirming H4 and H5. The outcome variable in this study is the firm financial performance which is measured by firm operation performance. Results have confirmed that firm operational performance significantly impacts firm financial performance, supported by H6: β = 0.408 path, significance p < .001, and t-statistics 6.555. Hence, the structural model has revealed a significant impact of all exogenous variables in measuring firm operational and financial performance.

Coefficient of determination (R^2), effect size (f^2), and predictive power (Q^2). The impact of a causal relationship is evaluated with effect size analysis and coefficient of determination R^2 to see how integrated supply chain factors independently and collectively affect a firm operational and financial performance. Results indicate that operational performance is measured by factors such as internal integration, process integration, product integration, just-in-time, and quality management, explained by substantial variance R^2 75.4% in firm operational performance. Therefore, factors including IT advancement and firm operational performance have shown considerable variance R^2 20.6% in measuring a firm's financial performance. On the other hand, the causal relationship is evaluated independently with effect size analysis f^2 consistent with earlier studies (Ngah et al., 2021; Rahi et al., 2021a; Yamin and Sweiss, 2020). The findings of the effect size analysis depict that product integration is the most important predictor due large effect size of 79%.

Nevertheless, just-in-time has shown importance in the second stage to measure firm operating performance. Results have shown a small impact of process integration, internal integration, and quality management to measure operating performance. Findings indicate that operational performance greatly affects a firm's finical performance. Table 6 depicts the findings of the coefficient determination and effect size analysis.

Results of the PLS algorithm have disclosed the coefficient of determination and effect size of the constructs. However, the predictive power of the factors is yet to be assessed with blindfolding analysis. According to Rahi et al. (2020), a research framework that incorporates multiple factors should be evaluated with predictive power instead of a coefficient of determination. The predictive power is examined using blindfolding analysis Q^2 (Rahi et al., 2020). Data were analyzed with a blindfolding approach by selecting two outcome variables: the firm's operational and financial performance. Results of the blindfolding analysis depict that the research framework has substantial predictive power Q^2 54.2% to measure the firm's

operational performance. Nevertheless, the predictive power to measure financial performance is also Q^2 14.8% notable. Hence, empirical evidence revealed that an integrated supply chain model is theoretically and statistically effective in enhancing a firm operational and financial performance.

Table 6. Coefficient of determination (R^2), Effect size (f^2), and Blind folding (Q^2)

Operational Performance of the Firm				
Factors	**R^2**	**Q^2**	**f^2**	**Findings**
Operational Performance of the Firm	0.754 %	0.542 %		
Internal integration			0.089	Small
Just in time			0.125	Small
Process integration			0.067	Small
Product integration			0.790	Substantial
Quality management			0.050	Small
Financial Performance of the Firm				
Factors	**R^2**	**Q^2**	**f^2**	**Findings**
Financial Performance of Firm	0.206 %	0.148 %		
IT advancement			0.025	Small
Operational performance of the Firm			0.209	Medium

Sources: developed by the authors.

Importance and performance analysis using IPMA. Although the structural model has disclosed variance explained by all exogenous factors in measuring endogenous factors, the importance and performance of these exogenous factors are yet to be scrutinized. The researchers have employed IPMA analysis to unveil the importance and performance of the factors consistent with earlier studies (Rahi, 2017; Rahi et al., 2020; Yamin, 2020b; Yamin and Alyoubi, 2020). IPMA analysis indicates that the importance of operational performance in measuring a firm's financial performance is substantial. Therefore, process integration in the supply chain is important in the second stage. Similarly, the importance of IT advancement and just-in-time supply chain strategy is found considerable.

Interestingly, product integration has shown the least importance when estimated with a firm financial performance. However, product integration has shown a substantial effect size in measuring the firm's operational performance. Table 7 shows the IPMA analysis results with the measure's importance and performance.

Table 7. Results of the IPMA analysis

Constructs	Importance of Firm Financial Performance	Performance Index
Internal integration	0.068	63.216
IT advancement	0.165	60.357
Just in time	0.100	59.811
Operational Performance	0.442	67.445
Product integration	0.059	60.015
Process integration	0.211	71.314
Quality management	0.053	61.407

Sources: developed by the authors.

To understand how importance and performance impact a firm financial performance researcher has incorporated the IPMA map. IPMA map shows the importance of the constructs on the x-axis. However, the performance of the measure can be seen on the y-axis. IPMA map depicts that internal integration, quality management, and product integration have less importance in measuring a firm financial performance. However, constructs like operational performance, process integration, JIT supply chain strategy, and IT advancement can boost a firm financial performance. Therefore, policymakers should concentrate on achieving operational performance, process integration in the supply chain, implementation of JIT strategy, and use of advanced IT in designing a supply chain model which ultimately boosts the firm's financial performance. Figure 2 exhibits the IPMA map.

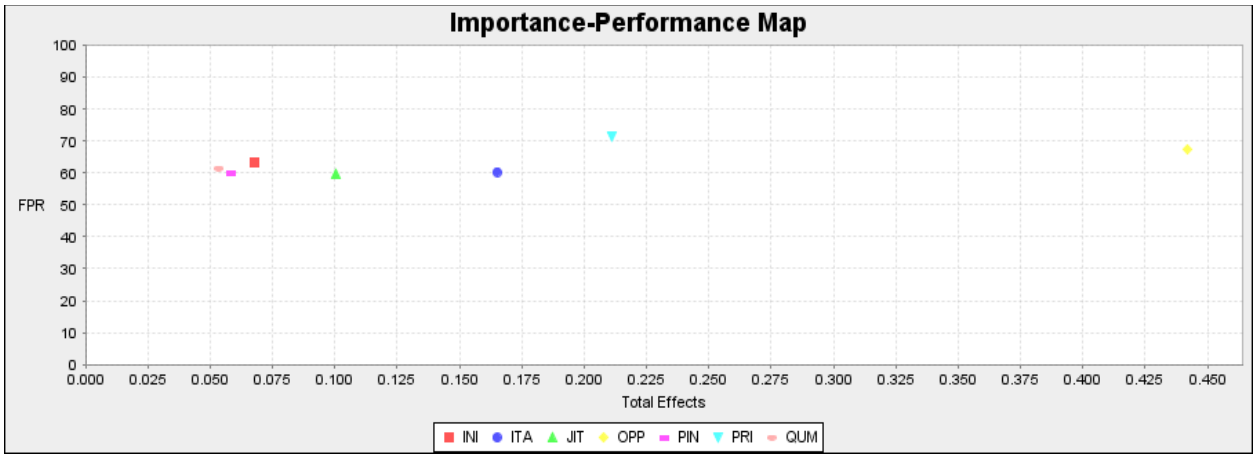

Figure 2. IPMA analysis map

Sources: developed by the authors.

The moderating analysis. IT advancement in the supply chain process reduces a firm's transactional and operational costs, improving its operational performance (Tippins and Sohi, 2003). In support of this argument, this study conceptualized IT advancement as moderating factor between a firm operational and financial performance. The moderating effect of IT advancement is tested with the product indicator approach (Rahi and Ghani, 2019; Hair et al., 2016). Data is bootstrapped with 5000 dummy responses to produce t-statistics and beta values (Hair et al., 2016). The findings of the moderating analysis revealed that IT advancement has a positive moderating impact on the relationship between firm operational and financial performance and is statistically supported by ($\beta = 0.153$, significant at $p < .05$, t-statistics 1.942). Figure 3 shows the statistical values.

The result of the moderating analysis has confirmed a significant moderating effect of IT advancement between firm operational and financial performance. Nevertheless, the strength of the moderating analysis is tested with a simple slope analysis. According to Rahi et al. (2018), simple slope analysis shows the strength of the relationship through the gradient. Therefore, it must be considered in moderating analysis. Simple slope analysis revealed that IT advancement is depicting upward trend ITA at +1 SD in a simple slope graph.

Nevertheless, IT advancement shows a downward ITA at -1 SD in a simple slope graph. These findings indicate that increase in IT advancement in the supply chain process will enhance the relationship between a firm's operational and financial performance. Figure 4 presents the graph of simple slope analysis.

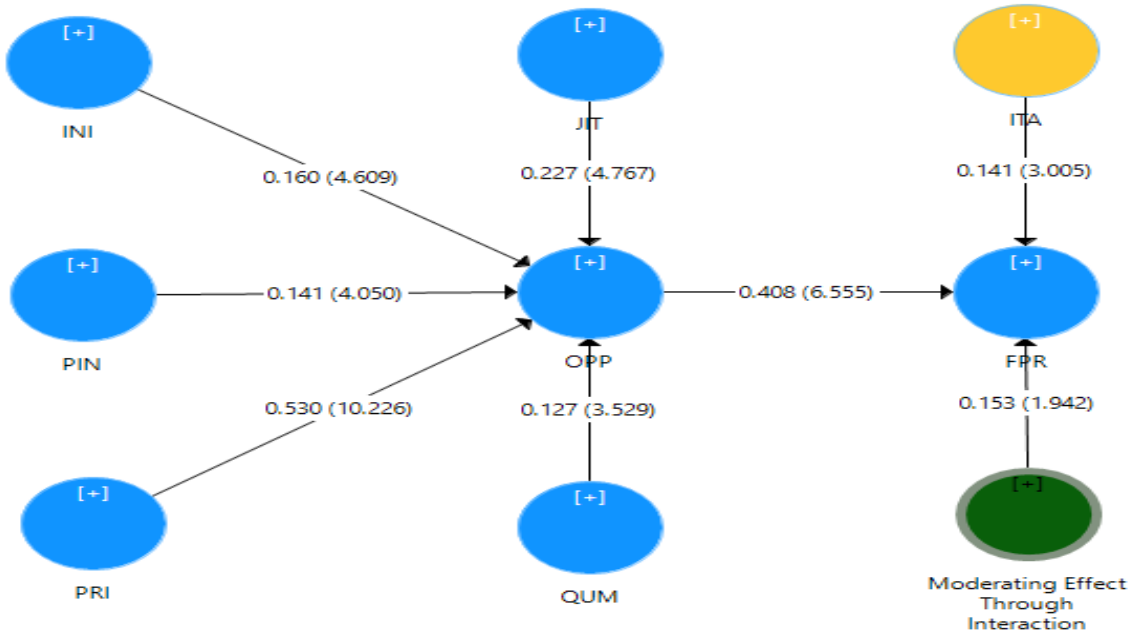

Figure 3. Moderating analysis

Sources: developed by the authors.

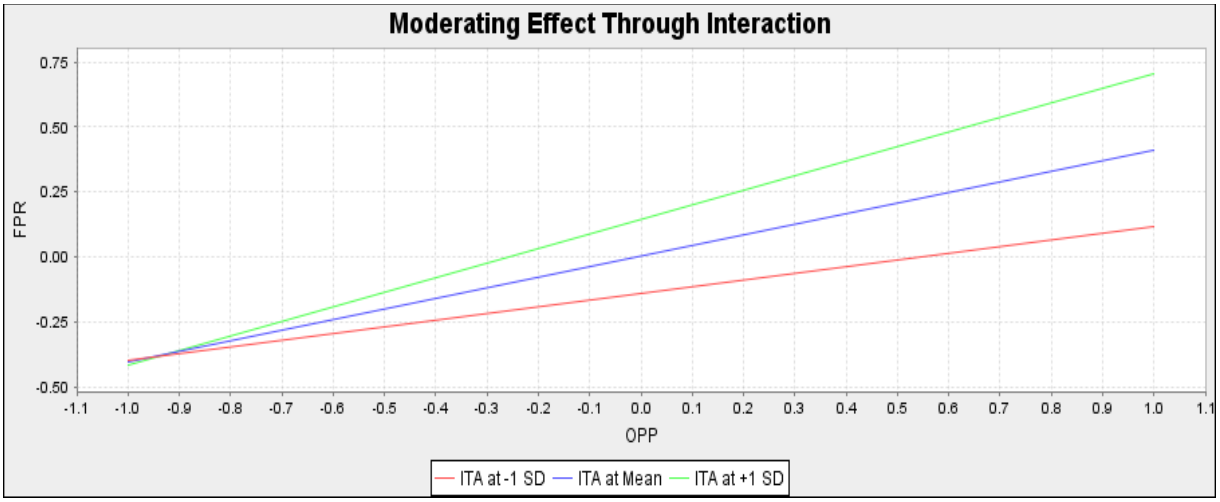

Figure 4. The output of simple slope analysis

Sources: developed by the authors.

The findings of this study provide useful insight into how to enhance a firm operational and financial performance using an integrated supply chain strategy. The research model comprises supply chain integration factors, quality management, and just-in-time to examine a firm's operational performance and revealed substantial variance R^2 75.4 % in the operational performance of a firm. The research model is further investigated with IT advancement and operational performance and has shown notable variance R^2 20.6% in predicting the firm's financial performance. The relationship between constructs is compared and contrasted with prior studies. It is found that three dimensions of supply chain integration, namely internal integration, process integration, and product integration, have shown a positive impact on the operational performance of a firm and are consistent with prior studies (Ayoub et al., 2017); Flynn et al. (2010); Huo et al. (2014); (Schoenherr and Swink, 2012). Therefore, the impact of just in time was substantial in measuring a firm's operational performance and in line with Heizer (2016).

Similarly, quality management was found to be another important factor in measuring a firm's operational performance and consistent with Green et al. (2019). Under the moderating effect of IT advancement, this research has established that advancement in technology boosts a firm's operational and financial performance, hence supporting the argument developed by Ayoub et al. (2017). The effect size analysis has disclosed that product integration presents a large effect size of 79%. Nevertheless, just in time is the second most important factor in measuring the firm's operational performance. In addition, the IPMA analysis has concluded that factors such as operational performance, process integration, JIT strategy, and IT advancement can enhance a firm's financial performance. The structural model results, effect size analysis, and importance-performance indexes assist managers in better ascertaining how supply chain integrated factors, including just-in-time and quality management. IT advancement positively impacts the firm's operational performance during the COVID-19 pandemic and enhances its financial performance.

The theoretical and practical contribution. This study has several contributions to theory and practice. Theoretically, this research combines supply chain integration, just-in-time, quality management, and IT advancement factors to investigate a firm operational performance and enrich the scientific background. Another theoretical contribution of this study is to extend the research model with moderating effect of IT advancement between operational performance and firm financial performance. Therefore, analyzing the moderating effect of IT advancement adds dimension to academic literature. This study has been conducted at a large scale in terms of methods. It includes respondents from manufacturing firms, including construction equipment, transportation, electronic products, engineering, chemical, pharmaceutical, and healthcare manufacturers.

Similarly, the latest statistical methods, such as structural equation modeling, effect size analysis, blindfolding analysis, prior power analysis, and IPMA analysis, have been employed in this study and hence substantially contribute to methods. Concerning practical implications, this study suggests that policymakers should concentrate on achieving firm operational performance, process integration, JIT strategy, and IT advancement, which ultimately boosts the firm's financial performance. This research provides a guideline to manufacturers on how to design supply chain processes with supply chain integration and just-in-time supply

chain practices to achieve firm operational performance. In the current scenario where the world is facing an unprecedented situation due to the COVID-19 pandemic, examining the role of just-in-time supply chain practice would benefit manufacturer suppliers and customers.

Conclusions. This study is designed to investigate factors that influence a firm operational performance. This research provides a guideline to manufacturers on designing supply chain processes with supply chain integration, just-in-time supply chain practices, and quality management to achieve firm operational performance. In the current scenario wherein, the world is facing an unprecedented situation due to the COVID-19 pandemic, examining the role of just in supply chain practice would benefit manufacturers, suppliers, and customers. Empirical evidence has shown that internal integration, process integration, product integration, just-in-time, and quality management explained substantial variance R^2 75.4% in firm operational performance. Therefore, factors including IT advancement and firm operational performance have presented considerable variance R^2 20.6% in measuring a firm's financial performance. In addition, the blindfolding analysis depicts that the research framework has substantial predictive power of Q^2 54.2% to measure the firm's operational performance.

Similarly, the predictive power to measure financial performance is also notable in $Q^2$14.8%. This empirical evidence revealed that the integrated supply chain model is theoretically and statically reliable for enhancing a firm operational and financial performance. The research model is extended with moderating effect of IT advancement between firm operational and financial performance. Results of the structural model have confirmed a significant moderating effect of IT advancement between firm operational and financial performance. Therefore, policymakers are encouraged to use IT tools in manufacturing firms to manage supply chain operations, enhancing firm operational and financial performance. The IPMA analysis has produced a holistic view of underpinned factors and suggested that among supply chain practices, the impact of process integration, just-in-time approach, and IT advancement is substantial in determining a firm operational and financial performance. Therefore, managers and policymakers should consider these factors in designing and developing new supply chain strategies.

Research limitations and future direction. Although current research has revealed several useful findings, caution should be exercised in interpreting the results. This research has proposed an integrative supply chain model that combines supply chain integration strategy, just-in-time, quality management, and IT advancement to investigate a firm operational performance. However, the present study does not include all factors that influence a firm's operational and financial performance. Factors such as supply chain intelligence, knowledge sharing, cooperation, and capabilities could influence a firm operational performance and therefore need researchers' and practitioners' attention. Another limitation of this study is that the research design is based on a cross-sectional approach and therefore collects data at one point. Alternatively, future researchers are suggested to examine the current research model in a longitudinal setting to disclose more interesting findings. This study is designed and conducted under the positivist paradigm. Data was collected through structured questionnaires. However, the direct opinion of managers through interviews could enhance the generalizability of this study. Therefore, future researchers are suggested to test the current research model in mixed mode to ascertain how integrated factors influence a firm operational and financial performance.

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References

Agyabeng-Mensah, Y., Afum, E., Agnikpe, C., Cai, J., Ahenkorah, E., & Dacosta, E. (2020). Exploring the mediating influences of total quality management and just in time between green supply chain practices and performance. *Journal of Manufacturing Technology Management*, *32*(1), 156-175. [Google Scholar] [CrossRef]

Al-Dhaafri, H. S., & Al-Swidi, A. (2016). The impact of total quality management and entrepreneurial orientation on organizational performance. *International Journal of Quality & Reliability Management*, *33*(5), 597-614. [Google Scholar] [CrossRef]

Ataseven, C., & Nair, A. (2017). Assessment of supply chain integration and performance relationships: A meta-analytic investigation of the literature. *International journal of production economics*, *185*, 252-265. [Google Scholar] [Google Scholar]

Ayoub, H. F., Abdallah, A. B., & Suifan, T. S. (2017). The effect of supply chain integration on technical innovation in Jordan: the mediating role of knowledge management. *Benchmarking: An International Journal*, 24(3), 594-616. [Google Scholar] [CrossRef]

Bader, A. A., & Mohammad, A. Y. Y. (2019). The impact of task technology fit on employee job performance. *Marketing and Management of Innovations*, 4, 140-159. [Google Scholar] [CrossRef]

Bandoophanit, T., & Pumprasert, S. (2022). The paradoxes of just-in-time system: an abductive analysis of a public food manufacturing and exporting company in Thailand. *Management Research Review*. 45(8), 1019-1943. [Google Scholar] [CrossRef]

Barney, J., Wright, M., & Ketchen Jr, D. J. (2001). The resource-based view of the firm: Ten years after 1991. *Journal of management*, *27*(6), 625-641. [Google Scholar] [CrossRef]

Bienhaus, F., & Haddud, A. (2018). Procurement 4.0: factors influencing the digitisation of procurement and supply chains. *Business Process Management Journal*, *24*(4), 965-984. [Google Scholar] [CrossRef]

Brakman, S., Garretsen, H., & van Witteloostuijn, A. (2020). The turn from just-in-time to just-in-case globalization in and after times of COVID-19: An essay on the risk re-appraisal of borders and buffers. *Social Sciences & Humanities Open*, *2*(1), 100034. [Google Scholar] [CrossRef]

Chen, I. J., & Paulraj, A. (2004). Towards a theory of supply chain management: the constructs and measurements. *Journal of operations management*, *22*(2), 119-150. [Google Scholar] [CrossRef]

Chung, W., Talluri, S., & Kovács, G. (2018). Investigating the effects of lead-time uncertainties and safety stocks on logistical performance in a border-crossing JIT supply chain. *Computers & Industrial Engineering*, *118*, 440-450. [Google Scholar] [CrossRef]

Churchill Jr, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of marketing research*, *16*(1), 64-73. [Google Scholar] [CrossRef]

Cohen, J. (2013). *Statistical power analysis for the behavioral sciences*. Routledge. [Google Scholar]

Feng, M., Yu, W., Wang, X., Wong, C. Y., Xu, M., & Xiao, Z. (2018). Green supply chain management and financial performance: The mediating roles of operational and environmental performance. *Business strategy and the Environment*, *27*(7), 811-824. [Google Scholar] [CrossRef]

Flynn, B. B., Huo, B., & Zhao, X. (2010). The impact of supply chain integration on performance: A contingency and configuration approach. *Journal of operations management*, *28*(1), 58-71. [Google Scholar] [CrossRef]

Fornell, C., & Larcker, D. F. (1981). Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics. *Journal of Marketing Research*, 382-388. [Google Scholar] [CrossRef]

Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of management information systems*, *18*(1), 185-214. [Google Scholar] [CrossRef]

Green, K. W., Inman, R. A., Sower, V. E., & Zelbst, P. J. (2019). Impact of JIT, TQM and green supply chain practices on environmental sustainability. *Journal of Manufacturing Technology Management*, *30*(1), 26-47. [Google Scholar] [CrossRef]

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. (2010). Multivariate Data Analysis: Pearson Education. *Upper Saddle River, New Jersey*. [Google Scholar]

Hair, J. F., Page, M., & Brunsveld, N. (2019). *Essentials of business research methods*. Routledge. [Google Scholar]

He, Y., Sun, H., Ni, W., & Ng, S. C. (2017). Re-examining the effects of supplier integration on operations performance: a relational view. *International Journal of Operations and Production Management*, *37*(12), 1702-1721. [Google Scholar] [CrossRef]

Heizer, J. (2016). *Operations management, 11/e*. Pearson Education India. https://books.google.com.sa/books?id=ZcbODAAAQBAJ

Huo, B., Qi, Y., Wang, Z., & Zhao, X. (2014). The impact of supply chain integration on firm performance: The moderating role of competitive strategy. *Supply Chain Management: An International Journal*, *19*(4), 369-384. [Google Scholar] [Google Scholar]

Inman, R. A., Sale, R. S., Green Jr, K. W., & Whitten, D. (2011). Agile manufacturing: relation to JIT, operational performance and firm performance. *Journal of operations management*, *29*(4), 343-355. [Google Scholar] [CrossRef]

Ivanov, D., Dolgui, A., & Sokolov, B. (2019). The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics. *International Journal of Production Research*, *57*(3), 829-846. [Google Scholar] [CrossRef]

Jiang, B., Rigobon, D., & Rigobon, R. (2022). From Just-in-Time to Just-in-Case, to Just-in-Worst-Case: Simple Models of a Global Supply Chain under Uncertain Aggregate Shocks. *IMF Economic Review*, *70*(1), 141-184. [Google Scholar] [CrossRef]

Jyoti, J., Kour, S., & Sharma, J. (2017). Impact of total quality services on financial performance: role of service profit chain. *Total Quality Management & Business Excellence*, *28*(7-8), 897-929. [Google Scholar] [CrossRef]

Kathuria, R. (2000). Competitive priorities and managerial performance: a taxonomy of small manufacturers. *Journal of operations management*, *18*(6), 627-641. [Google Scholar] [CrossRef]

Kline, R. B. (2011). Principles and Practice for Structural Equation Modelling (3rd Eds). [Google Scholar]

Mackelprang, A. W., & Nair, A. (2010). Relationship between just-in-time manufacturing practices and performance: A meta-analytic investigation. *Journal of Operations Management*, *28*(4), 283-302. [Google Scholar] [CrossRef]

Ngah, A. H., Gabarre, S., Han, H., Rahi, S., Al-Gasawneh, J. A., & Park, S. H. (2021). Intention to purchase halal cosmetics: do males and females differ? A multigroup analysis. *Cosmetics*, *8*(1), 19. [Google Scholar] [CrossRef]

Oliveira, M. P. V. D., & Handfield, R. (2019). Analytical foundations for development of real-time supply chain capabilities. *International Journal of Production Research*, *57*(5), 1571-1589. [Google Scholar] [CrossRef]

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of applied psychology*, *88*(5), 879. [Google Scholar]

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. *Journal of management*, *12*(4), 531-544. [Google Scholar] [CrossRef]

Rahi, S. (2017a). Research design and methods: A systematic review of research paradigms, sampling issues and instruments development. *International Journal of Economics & Management Sciences*, 6(2), 1-5. [Google Scholar] [CrossRef]

Rahi, S. (2017b). Structural Equation Modeling Using SmartPLS. CreateSpace Independent Publishing Platform. [Google Scholar]

Rahi, S., & Ghani, M. A. (2019). Integration of DeLone and McLean and self-determination theory in internet banking continuance intention context. *International Journal of Accounting and Information Management*, *27*(3), 512-528. [Google Scholar] [CrossRef]

Rahi, S., Ghani, M. A., & Ngah, A. H. (2019a). Integration of unified theory of acceptance and use of technology in internet banking adoption setting: Evidence from Pakistan. *Technology in Society*, *58*, 101120. [Google Scholar] [CrossRef]

Rahi, S., Ghani, M., & Ngah, A. (2018). A structural equation model for evaluating user's intention to adopt internet banking and intention to recommend technology. *Accounting*, *4*(4), 139-152. [Google Scholar] [CrossRef]

Rahi, S., Ghani, M. A., & Ngah, A. H. (2020a). Factors propelling the adoption of internet banking: the role of e-customer service, website design, brand image and customer satisfaction. *International Journal of Business Information Systems*, *33*(4), 549-569. [Google Scholar] [CrossRef]

Rahi, S., Khan, M. M., & Alghizzawi, M. (2021). Factors influencing the adoption of telemedicine health services during COVID-19 pandemic crisis: an integrative research model. *Enterprise Information Systems*, *15*(6), 769-793. [Google Scholar] [CrossRef]

Rahi, S., Othman Mansour, M. M., Alghizzawi, M., & Alnaser, F. M. (2019b). Integration of UTAUT model in internet banking adoption context: The mediating role of performance expectancy and effort expectancy. *Journal of Research in Interactive Marketing*, *13*(3), 411-435. [Google Scholar] [CrossRef]

Rahi, S., Othman Mansour, M. M., Alharafsheh, M., & Alghizzawi, M. (2020b). The post-adoption behavior of internet banking users through the eyes of self-determination theory and expectation confirmation model. *Journal of Enterprise Information Management*, *34*(6), 1874-1892. [Google Scholar] [CrossRef]

Raja, M. W., Bodla, M. A., & Malik, S. A. (2011). Evaluating The Effect Of Total Quality Management Practices On Business Performance: A Study Of Manufacturing Firms Of Pakistan. *International Journal of Business and Social Science*, *2*(9). 110-117. [Google Scholar]

Ringle, C. M., Wende, S., & Becker, J. M. (2015). SmartPLS 3. *Boenningstedt: SmartPLS GmbH*, *584*.

Rowley, J. (2014). Designing and using research questionnaires. *Management Research Review*, *37*(3), 308-330. [Google Scholar] [CrossRef]

Schoenherr, T., & Swink, M. (2012). Revisiting the arcs of integration: Cross-validations and extensions. *Journal of operations management*, *30*(1-2), 99-115. [Google Scholar] [CrossRef]

Sharma, M., Luthra, S., Joshi, S., & Kumar, A. (2022). Developing a framework for enhancing survivability of sustainable supply chains during and post-COVID-19 pandemic. *International Journal of Logistics Research and Applications*, *25*(4-5), 433-453. [Google Scholar] [CrossRef]

Siagian, H., Tarigan, Z. J. H., & Jie, F. (2021). Supply chain integration enables resilience, flexibility, and innovation to improve business performance in COVID-19 era. *Sustainability*, *13*(9), 4669. [Google Scholar] [CrossRef]

Sweiss, M. I. K., & Yamin, M. A. Y. (2020). The influence of organisational and individual factors on organisational innovation with moderating role of innovation orientation. *International Journal of Business Innovation and Research*, *23*(1), 103-126. [Google Scholar] [CrossRef]

Swink, M., & Song, M. (2007). Effects of marketing-manufacturing integration on New Product Development time and competitive advantage. *Journal of operations management*, *25*(1), 203-207. [Google Scholar] [CrossRef]

Taylor, D. A. (2003). Supply chain vs. supply chain. *Computerworld*, *37*(45), 44-45. Retrieved from [Link]

Tigga, G. A., Kannabiran, G., & Arumugam, V. (2021). Exploring relationships among IT advancement, IT assimilation, supply chain capabilities and supply chain performance. *Journal of Decision Systems*, *30*(4), 414-438. [Google Scholar] [CrossRef]

Tippins, M. J., & Sohi, R. S. (2003). IT competency and firm performance: is organizational learning a missing link?. *Strategic management journal*, *24*(8), 745-761. [Google Scholar] [CrossRef]

Tseng, S. H., Wee, H. M., Reong, S., & Wu, C. I. (2019). Considering JIT in assigning task for return vehicle in green supply chain. *Sustainability*, *11*(22), 6464. [Google Scholar] [CrossRef]

Vanpoucke, E., Vereecke, A., & Muylle, S. (2017). Leveraging the impact of supply chain integration through information technology. *International Journal of Operations & Production Management*, 37(4), 510-530. [Google Scholar] [CrossRef]

Wu, F., Yeniyurt, S., Kim, D., & Cavusgil, S. T. (2006). The impact of information technology on supply chain capabilities and firm performance: A resource-based view. *Industrial Marketing Management*, *35*(4), 493-504. [Google Scholar] [CrossRef]

Yamin, M. (2020). Examining the role of transformational leadership and entrepreneurial orientation on employee retention with moderating role of competitive advantage. *Management Science Letters*, *10*(2), 313-326. [Google Scholar] [CrossRef]

Yamin, M. A. Y. (2019). The mediating role of ethical organisational climate between HRM practices and HR outcomes in public sector of Saudi Arabia. *International Journal of Business Excellence*, *19*(4), 557-573. [Google Scholar] [CrossRef]

Yamin, M. A. Y. (2020a). Examining the effect of organisational innovation on employee creativity and firm performance: Moderating role of knowledge sharing between employee creativity and employee performance. *International Journal of Business Innovation and Research*, *22*(3), 447-467. [Google Scholar] [CrossRef]

Yamin, M. A. Y. (2020b). The relationship between RIGHT ethical behavior perspective, demographic factors, and BEST ethical performance. *International Review of Management and Marketing*, *10*(1), 27-39. [Google Scholar] [CrossRef]

Yamin, M. A. Y., & Alyoubi, B. A. (2020). Adoption of telemedicine applications among Saudi citizens during COVID-19 pandemic: An alternative health delivery system. *Journal of infection and public health*, *13*(12), 1845-1855. [Google Scholar] [CrossRef]

Yamin, M. A. Y., & Mahasneh, M. S. (2018). The impact of values-based leadership on ethical loyalty in Saudi Arabian health organizations. *International Review of Management and Marketing*, *8*(3), 6-13. [Google Scholar]

Yamin, M. A. Y., & Sweiss, M. I. K. (2020). Investigating Employee creative performance with integration of DeLone and McLean Information system success model and Technology acceptance model: The moderating role of Creative self-efficacy. *International Journal of Business Excellence*, *22*(3), 396-417. [Google Scholar] [CrossRef]

Yang, J., Xie, H., Yu, G., & Liu, M. (2021). Achieving a just–in–time supply chain: The role of supply chain intelligence. *International journal of production economics*, *231*, 107878. [CrossRef] [Google Scholar]

Yao, M. J., & Hsu, T. C. (2018). An efficient search algorithm for obtaining the optimal replenishment strategies in assembly-type just-in-time supply chain systems. *Journal of Industrial and Production Engineering*, *35*(2), 118-128. [Google Scholar] [CrossRef]

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Формування фінансових результатів компанії: роль інноваційних інформаційних технологій в системі управління ланцюгом постачання та якістю

Глобальна конкуренція та невизначеність вимагають від виробників впровадження передових практик управління ланцюгами постачання, які сприяють досягненню конкурентних переваг у нестабільному бізнес-середовищі. Основною метою проведеного дослідження є встановлення впливу системи ланцюгів постачання, практики «точно-вчасно» та управління якістю на підвищення операційних та фінансових показників компанії під час кризи, спричиненої пандемією COVID-19. Досліджено вплив розвитку інноваційних інформаційних технологій на взаємозв'язок між операційними та фінансовими показниками компанії. Детерміновану вибірку даних сформовано на основі результатів опитування 380 респондентів, які є працівниками виробничих компаній, включаючи виробників будівельного обладнання, транспортних засобів, електронної продукції, машинобудування, хімічної, фармацевтичної та медичної продукції. Методичним інструментарієм проведеного дослідження стали методи структурного аналізу. В роботі розроблено емпіричну модель оцінки валідності та надійності отриманих результатів. Результати емпіричного дослідження засвідчили, що такі фактори як внутрішня інтеграція, інтеграція процесів, інтеграція продуктів, принцип «точно-вчасно» та управління якістю в сукупності пояснюють 75.4% дисперсії операційної діяльності фірми. До того, аналіз розміру ефекту (f^2) демонструє, що інтеграція продукту має найбільше значення у визначенні операційної діяльності компанії. Розроблена емпірична модель дозволяє здійснити прогнозування операційної діяльності компанії, коефіцієнт прогностична валідність моделі Q^2 складає 54.2%. За результатами дослідження встановлено, що розвиток інноваційних інформаційних технологій в ланцюгу постачання посилює взаємозв'язок між операційною та фінансовою діяльністю компанії. На основі отриманих результатів дослідження розроблено інтегровану модель ланцюга постачання для дослідження операційної діяльності фірми. Дана модель поєднує фактори інтеграції ланцюга постачання, принцип «точно-вчасно», управління якістю та розвиток інформаційних технологій. Результати проведеного дослідження можуть бути корисними власникам, провідним менеджерам компанії, які відповідають за розробку політики формування фінансових результатів компанії.

Ключові слова: результати емпіричних досліджень, внутрішня інтеграція, показники операційної діяльності, інтеграція процесів, інтеграція продукту.