Contribution of Information Sharing to Supply Chain Performance in Developing Country: Empirical Evidence from Manufacturing Plants in Vietnam

DOI: 10.12776/QIP.V27I2.1860

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Received: 2023-05-30 Accepted: 2023-07-04 Published: 2023-07-31

ABSTRACT

Purpose: This study empirically investigates effect of information technology (IT) link on supply chain performance through information sharing, supplier development, and knowledge absorption from customers.

Methodology/Approach: The data sample including 135 Vietnamese manufacturing plants was collected through a paper-based questionnaire survey. Statistical techniques such as correlation and regression analysis are applied for hypotheses testing.

Findings: It was shown that supply chain performs better when focal firms invest in supplier development and knowledge absorption. Those activities are strengthened by developing IT link and information sharing with suppliers and by customers.

Research Limitation/Implication: Sample size is relatively small due to limited time and resources; subjective measurement of constructs are limitations that can be addressed in future research.

Originality/Value of paper: This paper fills the gap in literature related with application of supply chain information in developing countries. It indicated that IT links should be regarded as the platform for information sharing among supply chain partners which lead to higher supply chain performance.

Category: Research paper

Keywords: information technology; information sharing; supply chain performance; developing countries; manufacturing companies

1 INTRODUCTION

Researchers have turned their attention to enhancing supply chain sustainability and performance due to the negative impact of environmental uncertainties, such as the recent COVID-19 pandemic (e.g., Shahed et al., 2021; Shen and Sun, 2021). Furthermore, there is a recognized need to establish effective information technology (IT) infrastructure and promote extensive information sharing to ensure greater communication and collaboration within the supply chain (Hoek, 2020; Sarkis, 2020). The role of IT link, which involve the integration of electronic tools with key suppliers and customers, is highlighted as it enables the intensification and acceleration of information sharing, leading to improved buyer-supplier relationships (Srimarut and Mekhum, 2020; Vanpoucke, Vereecke and Muylle, 2017).

The existing body of literature concerning the enhancement of supply chain performance through IT and information sharing has predominantly focused on developed contexts, particularly Western countries, and North America (Baihaqi and Sohal, 2013; Paulraj and Chen, 2007; Prajogo and Olhager, 2012). However, empirical evidence in developing countries remains limited (Ye and Wang, 2013). Developing countries play a crucial role in global supply chains, particularly within the manufacturing industry, as they offer diverse sources of materials, cost-effective skilled labour, access to new markets, and political and macroeconomic incentives (Phan et al., 2019). Yet, these countries also face significant challenges arising from supply chain failures (Tukamuhabwa, Stevenson and Busby. 2017), emphasizing the need for empirical studies that specifically investigate methods to enhance supply chain performance in emerging economies.

This study examines the interrelationships between IT link, information sharing, supplier development, knowledge absorption, and supply chain performance. We contribute to existing literature in two aspects. Firstly, we focus on the Vietnamese manufacturing context since empirical evidence of those relationships is limited in the context of developing countries (Carr and Kaynak, 2007; Krause, Handfield and Tyler, 2007; Storey and Larbig, 2017). Secondly, prior studies have highlighted the critical role of IT capacity in supply chain performance (e.g., Prajogo and Olhager, 2012), but the underlying mechanisms are complex and contingent upon factors such as the compatibility of information systems among chain members (Posey and Bari, 2009) and a firm's capability to effectively process shared information (Lotfi et al., 2013). Therefore, the findings of this study are expected to provide implications for manufacturing firms in developing countries to utilize IT and information sharing as foundations in supply chain coordination and improving supply chain performance.

The next section presents a comprehensive literature review covering the key concepts. Subsequently, hypotheses development, conceptual model, and methodology are outlined, followed by findings and their implications. Finally,

we address the study's limitations and propose potential directions for future research.

2 LITERATURE REVIEW

2.1 Information Technology Links and Supply Chain Performance

Information technology (IT) link is defined as the application of similar automated systems or computer-to-computer links within or between firms and supply chain partners (Prajogo and Olhager, 2012). By integrating IT systems, organizations can create a distinctive value chain that enables collaboration with suppliers for timely deliveries and facilitates the flow of customer information, enhancing responsiveness (Baihaqi and Sohal, 2013; Ross, 2015). Supply chain integration and coordination activities, for example supplier development and learning from customers, plays a pivotal role in centralizing management across the value network, leading to improved information sharing and subsequently enhancing supply chain performance (Koçoğlu et al., 2011; Shee et al., 2018).

The presence of high-performing suppliers is vital for ensuring the sustainability and performance of the entire supply chain in terms of quality, cost, delivery, and responsiveness (Sánchez-Rodríguez, Hemsworth and Martínez-Lorente, 2005). It was found that technology adoption has a positive impact on supply chain performance, as it reduces costs and cycle time (Nandi et al., 2020; Shee et al., 2018; Vijayasarathy, 2010). However, to maximize the benefits of supply chain linkage, such as customer and supplier involvement, it is imperative to focus on IT integration and information sharing as foundational elements (Shukor et al., 2020).

2.2 Supplier Development

Supplier development refers to manufacturers' efforts in establishing a viable network of suppliers and enhancing their performance (Hahn, Watts and Kim, 1990). Originating in Japanese companies like Toyota and Honda, this strategic practice has expanded globally as a means to cultivate long-term buyer-supplier relationships (Glavee-Geo, 2019). Investing in supplier capabilities yields mutual benefits, including supernormal profits for both buyers and suppliers (Krause, Handfield and Tyler, 2007). Literature suggests that supplier development fosters enduring relationships, leading to cost reduction, improved quality and flexibility, and reliable delivery within the supply chain (Krause, Handfield and Tyler, 2007; Lee, Chan and Pu, 2018). Furthermore, supplier development initiatives positively impact supplier satisfaction, supplier performance, and facilitate new product development processes (Glavee-Geo, 2019; Modi and Mabert, 2007; Tran, Gorton and Lemke, 2021).

2.3 Knowledge Absorption from Customers

Knowledge absorption from customers refers to capability to learn from customers regarding product knowledge, demands, purchasing history, etc. (Salojärvi, Sainio and Tarkiainen, 2010). It has been studied that maintaining a good relationship with customers will create a healthy and prosperous organization in terms of cost-efficiency, profit, as well as innovation because companies can understand customers' desires then translate them into concrete product specifications to satisfy those needs (Nguyen and Harrison, 2018). Moreover, absorbing knowledge from customers as an essential external source would facilitate organizational learning, improving flexibility performance (Huo, Ha and Gu, 2020).

2.4 Research Context

The findings of previous studies regarding the impact of IT vary depending on factors such as the type of information, information intensity, and the capabilities of supply chain partners (Li and Lin, 2006; Sezen, 2008). Moreover, it is worth noting that most previous studies have predominantly focused on developed countries, leaving a research gap regarding the role of information sharing in supply chain performance within developing countries, which face challenges such as limited IT infrastructure and a predominance of small firms (Maskey, Fei and Nguyen, 2019). In light of these considerations, this study concentrates on the Vietnamese context as an emerging country for several reasons. Since the 1990s, Vietnam has become a participant in various trade agreements, including the World Trade Organization (WTO), Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), and EU-Vietnam Free Trade Agreement (EVFTA), which have presented both opportunities and challenges for Vietnamese companies to integrate into the global supply chain. Consequently, manufacturing firms in Vietnam have progressively adopted international standards, tools, and techniques to enhance operational performance (Phan et al., 2019). While many firms have implemented internal IT systems to facilitate information access, there remains a lack of emphasis on supply chain practices involving suppliers and customers due to resource constraints. Notably, most Vietnamese firms still rely on basic channels like emails or phones for information sharing in the supply chain, lacking integration of information systems with their partners (Pham et al., 2019). Therefore, it would be insightful to investigate the relationship between IT link and supply chain performance in Vietnam.

3 ANALYTICAL FRAMEWORK

Fig. 1 presents the conceptual model of this study.

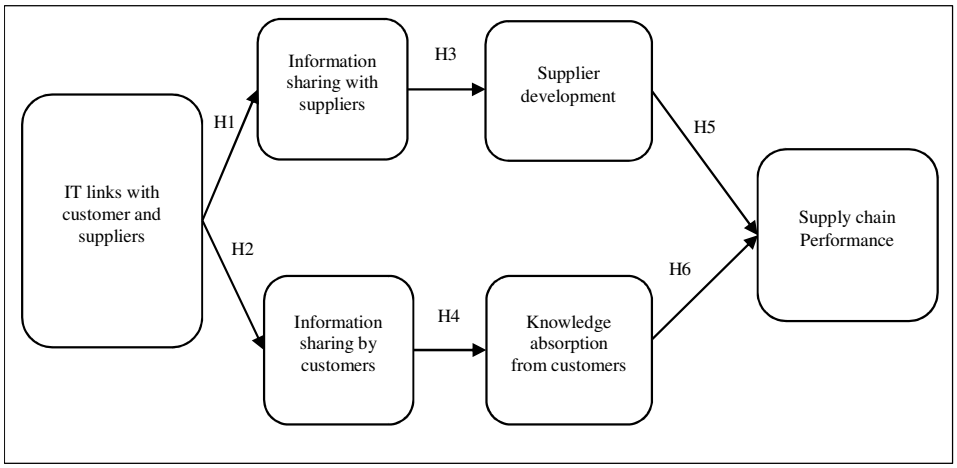

Figure 1 – Analytical Framework

Effective information sharing in the supply chain relies on the presence of an integrated IT system that enables real-time access to high-quality information, including inventory, delivery status, forecasting, and production planning details (Baihaqi and Sohal, 2013; Prajogo and Olhager, 2012). IT alignment plays a crucial role in coordinating activities with supply chain partners, allowing for seamless sharing of order information, operational details, strategies, and competition information with suppliers (Prajogo and Olhager, 2012). Similarly, the IT link benefits firms by providing a continuous understanding of customer demand, particularly when customers possess technical knowledge that enables them to monitor the production progress of their orders (Fawcett et al., 2007; Ye and Wang, 2013). Therefore, we hypothesize that:

H1, H2: Supply chain IT links has positive impact on level of information sharing with suppliers and information sharing by customers.

An increased information sharing with and by suppliers plays a supportive role in supplier development activities, leading to improvements in supplier capabilities and performance, including the provision of high-quality materials, cost reductions, and on-time delivery (Chen, Ellis and Holsapple, 2018). Therefore, manufacturers are more inclined to select and develop suppliers who demonstrate a higher level of information sharing, as it enhances their understanding of the suppliers' situations (Carr and Kaynak, 2007). The following hypothesis is proposed:

H3: Information sharing with suppliers positively affects supplier development.

Information sharing by customers offers insights into customer behaviour, enabling firms to enhance the product development process and improve

customer satisfaction. The acquisition of information sharing from customers serves as an initial step towards establishing a learning organization, wherein the assimilated information is leveraged for commercial exploitation (Huo, Ha and Gu, 2020). Hence, we propose that:

H4: Information sharing by customers positively affects firm's knowledge absorption from customers.

Supplier development initiatives bring mutual benefits for both focal firms and suppliers. For suppliers, such initiatives result in operational cost reduction and process improvement through knowledge transfer from the focal firms (Modi and Mabert, 2007). When it comes to focal firms, they benefit from high-quality materials, on-time delivery, and better inventory management. In more detail, they can reduce the supply base, then improves financial performance such as cost and revenue, and non-financial performance such as product quality, and customer satisfaction (Luo, Mallick and Schroeder, 2010). Moreover, absorbing knowledge from retailers regarding planning, forecasting, and replenishment allows firms to understand cyclical fluctuations in customer demand and preferences, leading to improved customer service (Grover and Kohli, 2012). This knowledge absorption also enables upstream firms including key suppliers to develop agility in sensing market opportunities (Roberts and Grover, 2014). Thus, the last two hypotheses are stated:

H5, H6: Supplier development and knowledge absorption from customers positively affect supply chain performance.

4 METHODOLOGY

4.1 Survey Instrument

The measurement scales were developed based on theoretical review and partly adapted from previous research in supply chain management and knowledge management (e.g., Baihaqi and Sohal, 2013; Carr and Kaynak, 2007; Krause, Handfield and Tyler, 2007; Paulraj and Chen, 2007; Salojärvi, Sainio and Tarkiainen, 2010; Vanpoucke, Vereecke and Muylle, 2017). A five-point Likert scale was used to measure the respondent's judgment by scoring each item from 1 to 5 (1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, and 5 = Strongly Agree). Supply chain IT links scale has four measurement items concerned the linkage of technology with suppliers and customers. Information sharing with suppliers and by customers are measured by six items each, representing six types of information that the focal firms sharing with suppliers and customers. The authors used seven items to measure the supplier development and five items to measure knowledge absorption from customers. Finally, supply chain performance is measured by how the focal firms satisfy with performance of key suppliers in terms of eight aspects such as quality, cost, delivery, etc.

4.2 Data Collection

Data used in this study is gathered from a questionnaire survey conducted during 2020-2021. The target group for this survey is Vietnam manufacturing companies that consist of three criteria:

- Achieving International Organization for Standardization (ISO) 9000 certification. In 2020, there are 5,850 companies in Vietnam certified ISO 9001:2015 (manufacturing companies covered 44%).
- Exporting products (to US, European countries, Japan, Korea, Australia,…) in the past 5 years.
- Belonging to one of three industries: electrical & electronics, machinery, and automobile.

These target manufacturing companies in Vietnam was proved in previous statistics and literature that focused on implementation supply chain management practices and supply chain quality management practices in Vietnam (Phan et al., 2019). Based on the list of ISO 9000-certified manufacturing companies provided by Directorate for Standard and Quality, Ministry of Science and Technology of Vietnam, the authors had selected and sent the invitation to 186 manufacturing companies, then got the acceptance feedback from 143 manufacturing showing their agreement to participate in this survey study. Subsequently, the paper-based questionnaire items (in both English and Vietnamese) were sent to those companies and the authors received the feedback from 135 manufacturing companies, which are summarized in Tab. 1.

Table 1 – Demography of Survey Sample

Sector	**Number**	**Demography of surveyed manufacturing companies**		
		Size (Number of employees in average)	Business experience (Number of years in business in average)	Annual sale (US$ millions in average)
Electrical & electronics	43	530	24	28
Machinery	55	460	21	25
Automobile	37	915	18	39
Total	135			

5 DATA ANALYSIS

5.1 Measurement Test

The measurement test result in Tab. 2 indicates that all scales have satisfactory levels of reliability and validity as the Cronbach's Alpha is greater than 0.6, Eigenvalues is larger than 1, and the Percentage of Variance exceeds 50%.

Table 2 – Measurement Test

Measurement scale	Min	Max	Mean	Standard deviation	Cronbach's Alpha	Eigenvalues	Percentage of variance
IT link with customers and suppliers	1.00	5.00	3.72	0.75	0.76	3.76	64%
Information sharing with suppliers	1.00	5.00	3.81	0.67	0.80	3.59	60%
Information sharing by customers	1.00	5.00	3.62	0.62	0.78	3.21	67%
Supplier development	1.00	5.00	3.88	0.65	0.83	3.20	62%
Knowledge absorption from customers	1.00	5.00	3.69	0.87	0.85	3.45	54%
Supply chain performance	1.00	5.00	3.95	0.83	0.82	3.14	69%

5.2 Hypothesis Testing

First, correlations between all pairs of six variables are analysed as depicted in Tab. 3. All factors are found to have positive and significant associations with each other.

Table 3 – Correlation Analysis

No.		1	2	3	4	5	6
1	IT links with suppliers and customers	1					
2	Information sharing with suppliers	0.63 **	1				
3	Information sharing by customers	0.54 **	0.65 **	1			
4	Supplier development	0.59 **	0.58 **	0.54 **	1		
5	Knowledge absorption from customers	0.62**	0.67 **	0.61 **	0.62 **	1	
6	Supply chain performance	0.60 **	0.59 **	0.60 **	0.63 **	0.56 **	1

Notes: ** $p < 0.01$ (2-tailed).

To test the proposed hypotheses, multiple regression models were developed with significant levels set at 5%. The results are shown in Tab. 4, indicating that all hypotheses are supported.

Table 4 – Summary of Regression Analysis

Dependent Variable	F-statistic	Sig. (F test)	R^2	Independent Variable	Coefficients	t-statistic	Sig. (t test)	VIF
Information sharing with suppliers	8.32	0.000	0.54	IT links with customers and suppliers	0.54	6.11	0.000	2.22
Information sharing by customers	9.45	0.000	0.64	IT links with customers and suppliers	0.37	3.79	0.009	2.69
Supplier developmentt	9.15	0.000	0.57	Information sharing with suppliers	0.48	5.57	0.000	2.19
Knowledge absorption from customers	8.07	0.00	0.63	Information sharing by customers	0.42	6.78	0.000	3.14
Supply chain performance	9.56	0.00	0.53	Supplier development	0.45	7.36	0.000	3.12
				Knowledge absorption from customers	0.32	3.51	0.000	1.80

Notes: VIF – variance inflation factor.

5.3 Supply Chain Leader's Interviews

For better understanding the situation of supply chain information sharing in Vietnam, the authors conducted in-depth interviews with 59 top managers of manufacturing companies in Vietnam. These 60-minute semi-structured interviews have been executed in late 2021 (both online and face-to-face) and focused in three main contents:

- Identifying the most challenging issues in supply chain management and supply chain information linkages in Vietnam,
- Identifying the limitations in supply chain information sharing practices,
- Identifying the initiatives in developing supply chain information sharing practices.

The main interview findings are presented in Tab. 5.

Table 5 – Summary of in-dept Interview

1	Challenging in supply chain management
	Mismatch between business direction and supply chain design (70%)
	Uncertain market demand (67%)
	Market risk (50%)
	Slow response from oversea supply chain partners (18%)
2	Challenging in supply chain information linkage
	Trust & credibility between supply chain partners (75%)
	Long term relationship between Foreign Direct Investment (FDI) and local companies (66%)
	Technological risk (50%)
3	Limitations in supply chain information sharing practices
	Lack of long-term planning in supply chain management (69%)
	Lack of reliable and qualified supplier (64%)
	Lack of real time visibility of quality, cost, service level, inventory information in supply chain (47%)
	Lack of IT infrastructure (30%)
	Lack of cross functional collaboration with inside manufacturing companies especially between marketing and production (25%)
	Lack of collaboration from customers (21%)
	Lack of collaboration from suppliers (10%)
4	Initiatives in developing supply chain information sharing practices
	Sharing information related with quality problems with key partners (70%)
	Using electronic transfer of purchase orders, invoices and/or funds to key suppliers (56%)
	Customers use IT to track and/or expedite shipments to focal companies (50%)
	Involving suppliers in product design and quality improvement (33%)
	Implementing Enterprise Resource Planning (ERP) system and share the information with supply chain partners (25%)
	Involving customers in product design and quality improvement (13%)

Notes: The value in bracket show the percentage of interviewee showed the same idea during the interview. For example: 70% of interviewee showed that "Mismatch between business direction and supply chain design" is regarded as the challenging in supply chain management in their business.

6 DISCUSSION

6.1 Main Findings and Implications

The main findings of this study are summarized as follows. First, the interview results indicate Vietnamese manufacturing firms have taken some steps to implement information sharing initiatives within their supply chains. However, the level of information linkage, particularly with downstream partners, remains low. The challenges associated with establishing IT links with customers and suppliers, particularly regarding trust and credibility, are also highlighted. Furthermore, supply chain information sharing practices are limited mainly due to lack of long-term relationship with reliable suppliers. These findings suggest that the development of supply chain IT linkage among Vietnamese manufacturing firms is still in its early stages.

Subsequently, the empirical findings reveal significant and positive relationships between supply chain IT links, information sharing with suppliers and by customers, supplier development, knowledge absorption from customers, and supply chain performance. These results align with previous studies conducted in both developed (e.g., Paulraj and Chen, 2007) and developing contexts (e.g., Tripathy et al., 2016; Ye and Wang, 2013), highlighting the importance of integrated IT systems in improving communication competencies and facilitating effective information exchange and developing context, in which the implementation of an integrated IT system would improve a firm's communication competencies, hence making the information exchange process uncomplicated. Furthermore, it corroborates previous works that higher information sharing with suppliers and by customers are helpful to determine emerging issues, and which knowledge and resources are needed (Carr and Kaynak, 2007; Krause, Handfield and Tyler, 2007). Moreover, the findings are in line with previous research related to organizational absorptive capacity, organizational learning, and supply chain integration (e.g., Shukor et al., 2020; Storey and Larbig, 2017).

This study brings managerial implications for supply chain management practitioners in such developing countries as Vietnam. Firstly, manufacturing firms in developing countries should strongly consider the transition from traditional communication methods to integrated information systems linked with supply chain partners (Pham et al., 2019). This shift serves as a foundation for improved information management and coordination. While initial investments of time, cost, and effort may be required to implement the new IT system, the long-term benefits in terms of financial and operational outcomes make it worthwhile. The IT system should enable both internal and external coordination activities, particularly in the context of information sharing with suppliers and customers (Ye and Wang, 2013).

Secondly, to enhance competitiveness and manage increasing complexity, firms should focus on developing strong and long-term relationships with core and

competent suppliers. In parallel, manufacturing managers in developing countries should appraise the significance of customers as a valuable knowledge source to improve firm's flexibility. It is undeniable that there are several challenges in developing countries when it comes to supply chain management, including mismatches between business direction and supply chain design, uncertain market demand, market risks, slow response from overseas partners, trust and credibility issues, long-term relationship establishment between Foreign Direct Investment (FDI) and local companies, and technological risks. To overcome these challenges, focal firms should implement supplier development initiatives that involve investing capital and resources, providing training, and offering incentives to recognize supplier efforts. The establishment of IT links with suppliers and retailers is crucial for facilitating information sharing and building trust, commitment, and a shared vision in inter-organizational relationships.

6.2 Limitations and Future Research

This study is not without limitations that can be solved in future research. First, the data was collected based on the perception of survey respondents, which causes bias in the data analysis, especially for performance measurement. Thus, future research can overcome this issue by investigating diverse types of performance using both subjective and objective measurements of scales. Supply chain performance can be broken down into several types such as financial (e.g., revenue, profit, return on asset) or non-financial (e.g., quality, cost, delivery, flexibility) to analyse and provide more implications. Second, because there are differences in some contextual factors, each manufacturing firm may implement IT in different ways. Future studies may re-examine the current framework and consider the effect of moderators or control variables such as industry, company size to bring out more interesting findings.

7 CONCLUSION

This study highlights the importance of effective information management in turbulent supply chain environments, particularly in developing countries like Vietnam. Limitations in information sharing practices are identified, including inadequate planning, unreliable suppliers, limited real-time visibility, IT infrastructure challenges, and lack of collaboration. To address these challenges and improve supply chain performance, managerial implications involve aligning strategies, implementing flexible approaches, mitigating risks, strengthening partnerships, addressing technology issues, and prioritizing long-term planning and reliable supplier relationships. Effective information links across the supply chain are crucial for achieving superior supply chain performance.

ACKNOWLEDGMENTS

This research is funded by Vietnam National Foundation for Science and Technology Development (NAFOSTED) under Grant No. 502.02-2020.19.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.