Impact Of Information Technology On Fast Food Supply Chain Performance: The Moderating Role Of Information Sharing

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Abstract

The objective of the study is to demonstrate the influence of information technology on fast food supply chain performance through information sharing. Research data were collected by quota sampling, with a sample size of 210 fast-food businesses in Vietnam. The authors combined qualitative methods and quantitative methods to reach the research objectives. Applying the structural equation modeling (SEM), the research has proven that information technology has a positive effect on information sharing, thereby positively impacting the performance of fast food supply chains. Research results have confirmed the essential role of information technology in fast food supply chain performance.

Keywords: information technology, information sharing, supply chain performance, business, fast food.

Introduction

Information technology plays an important role in supply chain operations, especially in the industrial revolution 4.0 (Nguyen & Hoang, 2022). Information technology has penetrated every stage of the supply chain, changing the way people perform activities related to exchange and linkages' quality (Palmer & Griffith, 1998). Information technology creates a close connection in the supply chain, which is significant for effective supply chain management (Kopczak, 1997; Simchi-Levi et al., 2003). In today's competitive environment, information technology is one of the strategies most applied by enterprises to enhance their competitive advantages (Pinto et al., 2013; Söderholm & Norrbin, 2014). The advancement of information technology facilitates the linkage between components in the supply

chain and minimizes supply chain operating costs (Huang et al., 2003; Siau & Tian, 2004; Li et al., 2006), and improves supply chain performance (Bakos et al., 1993; Chen et al., 2004). In recent years, several studies have been conducted to demonstrate the positive influence of information technology on supply chain performance (Chinomona, 2013; Sambamurthy et al., 2003; Wang et al., 2016; Chae et al., 2018; Basheer et al., 2019; Tian et al., 2020; Yun et al., 2020; Nguyen & Hoang, 2022). At the same time, many studies have proven that sharing information between members of the supply chain helps information circulate faster, reduces order response time, increases cooperation, and shares risks and benefits among members, thereby improving supply chain performance (Li, 2006; Madlberger, 2009; Koçoğlu et al., 2011; Wong et al., 2011; Du et al., 2012; Khan et al., 2016; Ahmad & Zailani, 2017; Gandhi et al., 2017; Afshan, 2018; De Vass et al., 2018; Nguyen & Hoang, 2022).

Most studies have been done in developed countries while few studies have been done in developing countries with similar contexts to Vietnam, especially for fast food supply chains. Therefore, this study was conducted to demonstrate the influence of information technology and information sharing on the performance of fast food supply chains in Vietnam.

Theoretical framework and research hypotheses

Theoretical framework

Information technology in supply chains

Information technology is a definition that includes computer systems, software, and internet networks used for data processing, exchange, storage, and sharing (Thong & Yap, 1995; Daintith, 2009). Information technology enhances supply chain efficiency by providing real-time information on product availability, inventory level, shipment status, and production requirements (Radstaak & Ketelaar, 1998). The application of information technology in supply chains helps to accelerate data exchange and information on contracts and real-time progress reports (Barratt, 2004). Information technology promotes supply chain operations through product improvement, online marketing, product quality assurance, and supporting business operations (Trainor et al., 2011; Lee et al., 2014; Peppard et al., 2014; Royle & Laing, 2014).

Information sharing in supply chains

Information sharing in a supply chain is the ability to handle the movement of information between actors in the supply chain (Shore

& Venkatachalam, 2003). Information sharing refers to necessary information that an enterprise communicates to partners in the supply chain (Li et al., 2006). Information sharing refers to the access to private data between trading partners, allowing them to track the progress of products and orders in different supply chain processes (Simatupang & Sridharan, 2002). Information that business owners can share with customers includes order fulfillment status, problems occurring during order processes, ability to deliver on time, and production capacity (Sezen, 2008). The quality of information sharing includes aspects such as accuracy, timeliness, completeness, and reliability of information exchanged (Monczka et al., 1998; Moberg et al., 2002). Information sharing is important for supply chain management (Monczka et al., 1998; Moberg et al., 2002).

Supply chain performance

Supply chain performance is the performance of processes and functions in the supply chain (Srinivasan et al., 2011). To measure supply chain performance, researchers often use two types of metrics: cost and reliability (Beamon, 1999; Holmberg, 2000; Sezen, 2008; Li et al., 2006). Cost metrics include out-of-business logistics costs, warehouse costs, storage costs, and asset turnovers. Reliability is demonstrated through the ability to fulfill orders, safety stock, and customer complaints (Lee et al., 2007). Some of the criteria commonly used to measure supply chain performance include inventory costs, on-time deliveries, product availability, performance, and response time (Beamon, 1999), flexibility (Vickery et al., 1999; Sezen, 2008; Qrunfleh & Tarafdar, 2014), the association among members (Stock et al., 2000; Qrunfleh & Tarafdar, 2014) and customer satisfaction level (Chen and Paulraj, 2004; Qrunfleh & Tarafdar, 2014).

Research hypotheses

The relationship between information technology and information sharing

Information technology plays an essential role in creating a successful and effective information-sharing process (Wu, 2009). According to Dubey et al. (2018), information technology is the basis to create software to provide reliable information to stakeholders. Besides, information technology helps organizations keep up-to-date with ongoing progress and data related to scheduling or delivery (Li et al., 2009). Information technology allows enterprises and suppliers to communicate openly and frequently, to discover and share more information (Kopczak, 1997; Simchi-Levi et al., 2003). Information technology promotes easier and more efficient information sharing,

improving organizational competitiveness (Ramakrishna, 2016; Ciccullo et al., 2018). Several studies have demonstrated the positive influence of information technology on information sharing in the supply chain (Lee & Whang, 2000; Jharkharia & Shankar, 2005; Li et al, 2011; Prajogo & Olhager, 2012; Lee & Joshi, 2016; Alderete et al., 2018; Nguyen & Hoang, 2022). Therefore, the study proposes hypothesis H1: Information technology has a positive impact on information sharing in fast food supply chains.

The relationship between information technology and supply chain performance

Information technology is one of the important factors in supply chain management, improving supply chain performance (Wang et al., 2016; Basheer et al., 2019). Information technology greatly enhances the quality of products/services and reliability during the delivery process (Brah & Ying Lim, 2006). Information technology improves business processes and the business performance of enterprises (Melville et al., 2004). Moreover, information technology allows organizations to internally integrate, or integrate with suppliers and customers to maximize operational efficiency (Kaliani Sundram et al., 2018; Tarigan et al., 2020). Many researchers have highlighted the positive influence of information technology on supply chain performance (Han et al., 2017; Chae et al., 2018; Daneshvar Kakhki & Gargeya, 2019; Tian et al., 2020; Yun et al., 2020; Nguyen & Hoang, 2022) and argue that competitive advantage in the supply chain can be achieved by the appropriate application of information technology (Sambamurthy et al., 2003; Chinomona, 2013; Wang et al., 2016). Hence, the study proposes hypothesis H2: Information technology has a positive impact on fast food supply chain performance.

Relationship between information sharing and supply chain performance

Information sharing is a major component in managing supply chain performance (Hudnurkar et al., 2014). Information sharing brings some benefits to supply chain management such as enhancing cooperation (Eng, 2006), reducing uncertainty/risk in forecasting (Li et al., 2006; Zhou & Benton, 2007), increasing response level, shortening production cycle (Premus & Sanders, 2008; Koçoğlu et al., 2011), Identify problems that arise quickly (De Vass et al., 2018), reducing cost, and efficient managing events in the supply chain (Soosay et al., 2008; Kim & Chai, 2017; Zhang et al., 2019). Researchers claim that information sharing has a positive impact on supply chain performance (Li et al., 2006; Madlberger, 2009; Koçoğlu et al., 2011; Wong et al., 2011; Du et al., 2012; Khan et al., 2016;

Ahmad & Zailani, 2017; Gandhi et al., 2017; Afshan, 2018; Nguyen & Hoang, 2022). The study proposes hypothesis H3: Information sharing has a positive impact on fast food supply chain performance.

Based on the literature review and the proposed research hypotheses, the study has applied focus group discussion, which is frequently used as a qualitative approach to gain an in-depth understanding of social issues. The group discussion was conducted with 7 fast food business managers in Vietnam and was under the authors' supervision. The results of the group discussion help identify the appropriate scales for the factors of the research model. The result of the discussion helps identify the appropriate scales for the research model. The research model is set up below.

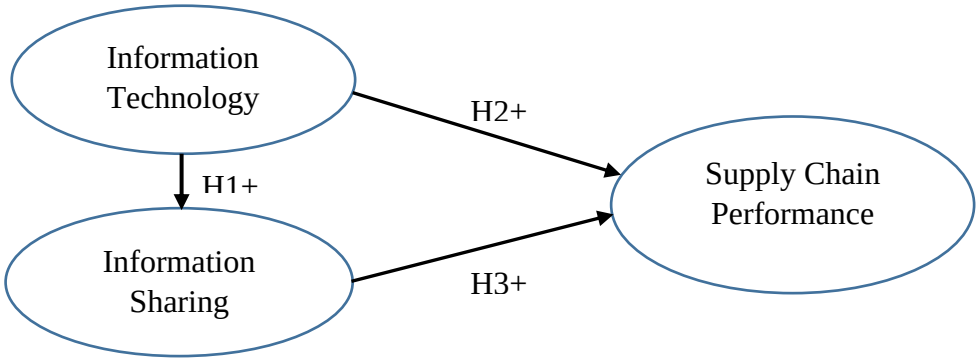

Figure 1: Proposed research model

Based on the literature review, the study proposes scales for the research model. The Information technology scale includes 4 observed variables based on the scales of Huo et al. (2014); Marinagi et al. (2014); Vanpoucke et al. (2017); Nguyen & Hoang (2022). The Information sharing scale includes 4 observed variables referenced from the scales of Huo et al. (2014); Afshan et al. (2018); Nazifa & Ramachandran (2019); Nguyen & Hoang (2022). The Supply chain performance scale includes 4 observed variables based on the scales of Mandal (2012), Nazifa & Ramachandran (2018), Obi et al. (2020), Yeh et al. (2020), Nguyen & Hoang (2022). The 5-point Likert scale is used to indicate the extent to which managers agree or disagree with each statement, in which (1) Completely disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Completely agree.

Table 1: Interpretation of observed variables in the research model

Factor	Observed variable	Scale	Reference resources
	IT1: Applying information technology in supply chain operations.	Likert 1-5	Huo et al. (2014), Marinagi et al. (2014),

Factor	Observed variable	Scale	Reference resources
Information technology (IT)	IT2: Information technology applications are always up to date.	Likert 1-5	Vanpoucke et al. (2017), Nguyen & Hoang (2022)
	IT3: Information technology systems have integrated capabilities.	Likert 1-5	
	IT4: Information technology equipment systems ensure good operation.	Likert 1-5	
Information Sharing (IS)	IS1: Information reliability is shared in the supply chain.	Likert 1-5	Huo et al. (2014), Afshan et al. (2018), Nazifa & Ramachandran (2019), Nguyen & Hoang (2022)
	IS2: Information technology is shared in the supply chain.	Likert 1-5	
	IS3: High level of information sharing between actors in the supply chain.	Likert 1-5	
	IS4: High level of information sharing with partners and customers.	Likert 1-5	
Supply Chain Performance (SCP)	SCP1: High level of risk management in the supply chain.	Likert 1-5	Mandal (2012), Nazifa & Ramachandran (2018), Obi et al. (2020), Yeh et al. (2020), Nguyen & Hoang (2022)
	SCP2: High level of responsiveness to market changes.	Likert 1-5	
	SCP3: High level of relationship quality management in the supply chain.	Likert 1-5	
	SCP4: Effective management of the organization's supply chain.	Likert 1-5	

Research methodology

Analytical methods

To test the research hypotheses, a combination of qualitative research and quantitative research is applied (Figure 2). In the first step, expert consultation is applied to identify the appropriate scales for factors in the research model. Then, analytical methods used to test research hypotheses include Testing the reliability of the scale by Cronbach's alpha coefficient, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modeling (SEM).

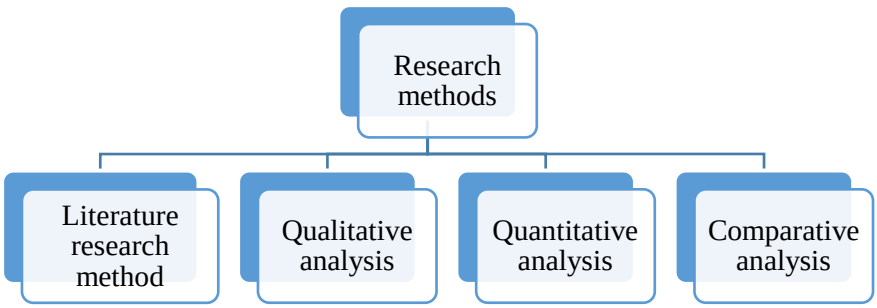

Figure 2: Flowchart of the research methods (compiled by the authors)

Data collection method

To ensure the reliability of the SEM test, the sample size should be large because it is based on the theory of sample distribution (Raykov & Widaman, 1995), and the sample size limit should be 200 observations (Hoelter, 1983; Hoyle, 1995). Based on the proposed research model, the sample size was determined to have at least 200 observations. The study applied online interviews via Google Forms. The survey was conducted from August 2022 to September 2022. The survey subjects are Directors/Deputy Directors of fast food companies. The study used quota sampling to collect data. The selected grouping criteria include enterprise scale and operating area. The research sample size achieved is 210 enterprises with headquarters located in major provinces/cities in Vietnam: Ho Chi Minh City, Hai Phong City, Can Tho City, Ba Ria Vung Tau Province, Binh Duong Province, and Khanh Hoa Province. Thus, the sample size meets the requirements, ensuring the reliability of the model test.

Research results and discussion

Research results

Evaluate the reliability of the scales

Exploratory factor analysis (EFA) was used to test the convergent and discriminant validity of the scales. The result achieves the following values: the reliability of the observed variables was satisfactory with a Factor loading value > 0 . 5 (Hair et al., 1998); The model's suitability test is satisfactory with the value of 0.5 < KMO = 0.894 < 1.0 (Hair et al., 1998); Bartlett's test on variable correlation reaches statistical value with Sig. = 0.00 < 0.05 (Hair et al., 1998); The cumulative variance test is satisfactory with a value of 67.18 % > 50% (Anderson & Gerbing, 1988). These analytical results have created 3 factors with Eigenvalue = 1.15 and there is no variable disturbance between factors, so the factors' names remain the same

Table 2: Evaluation of scale reliability

Observed variable	**Mean**	**Standard deviation**	**Factor loading**	**Cronbach's alpha**
Information Technology (IT)				**0. 819**
IT1	3.43	0.703	0.754	
IT2	3.36	0.903	0.732	
IT3	3.33	0.832	0.585	

IT4	3.32	0.806	0.780	
Information Sharing (IS)				**0. 807**
IS 1	3.52	0.778	0.769	
IS 2	3.57	0.750	0.647	
IS 3	3.60	0.819	0.691	
IS 4	3.49	0.778	0.699	
Supply Chain Performance (SCP)				**0.858**
SCP1	3.52	0.919	0.868	
SCP2	3.65	0.901	0.786	
SCP3	3.65	1.035	0.754	
SCP4	3.70	0.788	0.701	

Cronbach's alpha value is used to check the reliability of the scales. The result in Table 2 shows that all scales have Cronbach's alpha value greater than 0.7. The corrected item-total correlation values are greater than 0.3, so no observed variables were excluded from the research model (Nunnally, 1978; Peterson, 1994; Slater, 1995). Therefore, all observed variables meet the requirements and are used for the next confirmatory factor analysis (CFA).

The CFA result in Table 3 shows that the model is suitable for the market data with the following indicators: P-value = 0.023 and χ^2/df = 1.431 < 2 (Carmines & McIver, 1981). Besides, the GFI = 0.946, TLI = 0.974, and CFI = 0.980 are all greater than 0.9, and the RMSEA = 0.045 ≤ 0.08 (Bentler & Bonett, 1980; Anderson & Gerbing, 1988). The CFA result also indicates that the correlation value between factors is less than 1, so the model achieves unidimensionality. The standardized regression weights of the factors are all greater than 0.5 and the unstandardized regression weights are all statistically significant, so the model reaches convergent validity. Besides, the correlation coefficient and standard deviation are all < 0.9, so the model achieves discriminant validity (Hair et al., 2014).

Table 3: CFA analytical result

Criteria	CFA	Comparative index	Reference resources
χ^2/df	1.431	≤ 2	Anderson & Gerbing (1988), Hair et al. (2014)
P-value	0.023	< 0.05	
GFI	0.946	≥ 0.9	
TLI	0.974	≥ 0.9	
CFI	0.980	≥ 0.9	
RMSEA	0.045	≤ 0.08	

Based on Table 4, the P_c value (minimum 0.81) and P_{vc} value (minimum 0.51) of the scales are satisfactory (Fornell & Larcker, 1981). In addition

to this, the α value of factors are all greater than 0.8, so it is satisfactory (Nunnally & Bernstein, 1994). Thus, the research data is consistent with the market data, achieving convergent and discriminant validity, unidimensionality, and reliability.

Table 4: Testing the scales in the model

Factor	Number of observed variables	Composite reliability (P_c)	Average Variance Extracted (P_{vc})	Reference resources
Information Technology (IT)	4	0.82	0.54	Fornell & Larcker (1981)
Information Sharing (IS)	4	0.81	0.51	
Supply Chain Performance (SCP)	4	0.86	0.61	

Testing the research hypotheses

Structural equation modeling is applied to test the research hypotheses. Table 5 shows that all research hypotheses are accepted at the 1% significance level. Therefore, information technology and information sharing have a positive relationship with a statistical significance level of 1%. Besides, information technology and information sharing have a positive effect on fast food supply chain performance with statistical significance at 1%.

Table 5: Testing of research hypotheses

Relationship	Unstandardized			Standardized estimated value	Significance	Hypothesis
	Estimated value	Standard error S.E	Critical ratio C.R			
IS <-- IT	0.712	0.119	5.988	0.582	***	H1: accepted
SCP <-- IT	0.717	0.153	4.676	0.435	***	H2: accepted
SCP <-- IS	0.576	0.123	4.697	0.427	***	H3: accepted

Discussion

Hypothesis H1: Information technology positively impacts information sharing in the fast food supply chain. Based on the estimation results in Table 5, information technology and information sharing have a positive relationship with the standardized estimation coefficient of 0.582 and statistical significance p = 0.000. It concludes that adequate investment in information technology of fast food businesses improves the reliability and quality of information sharing among the supply chain's members. The research result has confirmed the important role of information technology in the information-sharing process (Wu, 2009), promoting an easier and more effective information-sharing process (Ramakrishna, 2016; Ciccullo et al., 2018). The finding is consistent with studies proposed by Lee & Whang (2000),

Jharkharia & Shankar (2005), Li et al. (2011), Prajogo & Olhager (2012), Lee & Joshi (2016), Alderete et al. (2018), Nguyen & Hoang (2022).

Hypothesis H2: Information technology positively impacts fast food supply chain performance. This hypothesis is accepted with the standardized estimated value of 0.435 and the statistical significance level p = 0.000. Thus, the more fast-food businesses invest in information technology, the better the performance of the fast-food supply chain. Information technology allows organizations to integrate internally, with suppliers and customers to maximize operational efficiency (Kaliani Sundram et al., 2018; Tarigan et al., 2020). The result is consistent with studies proposed by Han et al. (2017), Chae et al. (2018), Daneshvar Kakhki & Gargeya (2019), Tian et al. (2019), Yun et al. (2020), Nguyen & Hoang (2022).

Hypothesis H3: Information sharing has a positive impact on fast food supply chain performance. Based on Table 5, information sharing has a positive effect on fast food supply chain performance, with a standardized estimated value of 0.427 and statistical significance p = 0.000. The result has confirmed that information sharing is an important component of supply chain performance management (Hudnurkar et al., 2014), enhancing cooperation in the supply chain (Eng, 2006), improving the level of order response (Premus & Sanders, 2008; Koçoğlu et al., 2011), contributing significantly to cost reduction and efficient activity management (Soosay et al., 2008; Kim & Chai, 2017; Zhang et al., 2019). The result is similar to studies proposed by Li et al. (2006), Madlberger (2009), Koçoğlu et al. (2011), Wong et al. (2011), Du et al. (2012), Khan et al. (2016), Ahmad & Zailani (2017), Gandhi et al. (2017), Afshan (2018), Nguyen & Hoang (2022).

Conclusion

Overall, the study has achieved the research objective, which is to demonstrate the role of information technology in the performance of fast food supply chains in Vietnam. The study has demonstrated the positive influence of information technology on fast food supply chain performance. Besides, information technology has a positive impact on information sharing, thereby improving the efficiency of the Vietnamese fast food supply chain. The governance implication suggested is that fast food supply chain managers need to pay special attention and invest properly in information technology. Administrators should establish regulations on the management and exchange of information in the supply chain. The research results are helpful references for fast food supply chain managers and supply chain researchers.

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