

# GUIDELINES FOR SUCCESSFUL SUPPLY CHAIN MANAGEMENT IN INDUSTRIAL BUSINESSES

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## ABSTRACT

***Aim:** The objective of this research was to study the guidelines for successful supply chain management in industrial businesses. It was an inductive research using the mixed methodology research including qualitative research method with in-depth interview and quantitative research method with quantitative data collection from the supply chain executives representing 500 organizations of both large enterprise and small and medium enterprises (SMEs) to analyze and develop the structural equation modeling (SEM) and finally get the structural equation model with the perfection and congruence of empirical data*

***Finding:** The results of the research revealed that the guidelines for successful supply chain management in industrial businesses at the highest percentage were: strategic management focusing on quality, environment, and safety to meet the highest satisfaction of customers ; information technology focusing on the security of information system; knowledge management focusing on the application of knowledge, the analysis of knowledge, key performance indicator, and organization performance assessment; and integration focusing on teamwork with the performance and operation assessment throughout the supply chain. The results of research hypothesis test showed that the large enterprise and small and medium enterprises (SMEs) focused on the successful supply chain differently at statistical significance level of 0.05.*

***Conclusion:** This research could be concluded that the success of guidelines for successful supply chain management in industrial businesses helped the entrepreneurs reduce the operation costs, and it was a good foundation of enhancing the competency of supply chain management to help the entrepreneurs' competitiveness become international. The results of structural equation model analysis were proved by congruence evaluation criteria including Chi-square probability of .105, relative Chi-square of 1.106, index of item objective congruence of .960, and root mean square error of approximation of .016.*

**Keywords:** Structural Equation Modeling, Successful Supply Chain Management, Industrial Business.

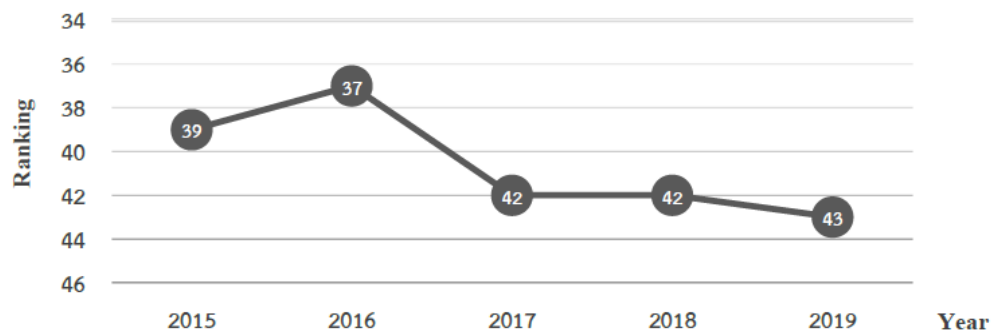
## INTRODUCTION

The economic structure of Thailand is related to the world economics, and the social and technological growth has changed the customers' behavior. It enhances a serious competitiveness and becomes international. Most organizations have been developing and focusing on all sectors to enhance their competency. This is in accordance with the concept of supply chain

management: sharing and exchanging the information of operation with the effective performance improvement and development throughout the supply chain. The supply chain management is the basis of improving the operational efficiency of organizations to maximize customer value and achieve a sustainable competitive advantage.

The problems and obstacles of supply chain management are the preparation of organizations to develop the knowledge and skills of the workforce and create technology and innovation to improve the organizational competency directly affecting the efficiency improvement of supply chain management in the industrial business sector. This is in accordance with the report of World Talent Ranking of the International Institute for Management Development (IMD) in 2019 which found that Thailand is quite delayed for preparation in many ways especially for personnel readiness which is one of the most important manufacturing factors in the economic system of Thailand’s industrial business sector, and the readiness of digital technology, and technology and innovation to further the knowledge of supply chain management and enhance the business value to increase the competitiveness. The three main characteristics of the delay for the development of Thailand are as follows:

1. The personnel readiness of Thailand industrial sector considering the personnel talent/skills, training, knowledge and skills necessary for adaptation of nonstop changes and applicable for systematic cooperation in the supply chain management as shown in the Figure 1 below.

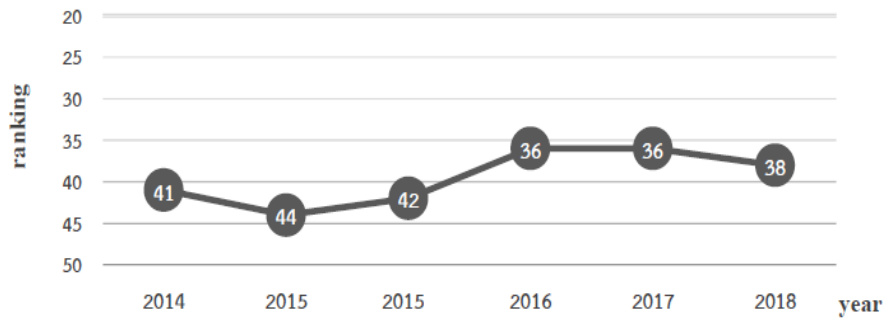


**FIGURE 1  
PERSONNEL READINESS**

2. The digital readiness of knowledge, and business and social agility for the supply chain management of industrial business sector considering the digital competency of the three main factors: 1) digital knowledge, 2) digital technology, and 3) future readiness as shown in Table 1 below.

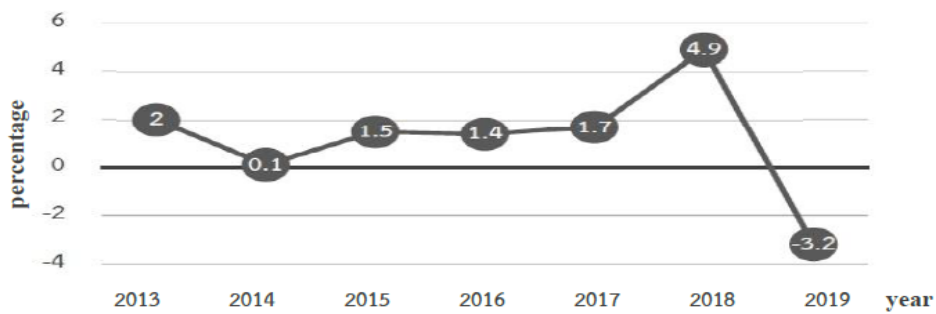
Main factors	2015	2016	2017	2018	2019
Digital competitiveness	42	39	41	39	40
Digital knowledge	48	42	44	44	43
Digital technology	33	30	30	28	27
Future readiness	50	48	45	49	50

3. The adaptation readiness of information technology and innovation implemented for systematic cooperation in the supply chain management which is in accordance with the report on “*Innovation for Country’s Future Development Targets*” as shown in the Figure 2 below.



**FIGURE 2**  
**THE RANKING OF TECHNOLOGY READINESS OF THAILAND’S INDUSTRY**

The problems mentioned above are the main factor affecting Thailand’s industrial business sector. This decreases the GDP growth and causes the GDP to fluctuate all the time as shown in the Figure 3 below.



**FIGURE 3**  
**GDP GROWTH OF THAILAND’S INDUSTRIAL SECTOR DURING 2013-2019**

The survey of GDP growth found that there was a decrease in the growth rate from 1.5 percent in 2015 to 1.7 percent in 2017, and an increase of 4.9 percent in 2018, but there were some fluctuations and tendency to decrease of -3.2 percent in 2019.

Thailand needs to get ready for the workforce e.g., performance skills; expertise in the supply chain management; digital knowledge; technology implemented for work and skill development of creating innovation. The industrial business sector must get ready for international trade, change the basic economic structure into the industry driven by knowledge management, improve the efficiency of work performance to meet the international standard and participate in the world supply chain. To ensure sustainable and competitive advantages while reducing operation cost in supply chain, enterprises head to take into account the following four key considerations of successful supply chain management in the industrial business sector.

**Knowledge Management**

It involves the competency of knowledge management, process of creating knowledge, knowledge transfer, and knowledge sharing to enhance the integrated organizational

competitiveness and focus on knowledge development (Silpcharu & Wantanakomol, 2017), expertise in strategies and information technology management throughout the supply chain to reduce the total costs of organizations and enhance the supply chain competency (Daghfous & Zoubi, 2017), and responsibility for society and environment with good governance and organization management for sustainable development (Chkanikova, 2016). The knowledge of supply chain consists of 1) knowledge of supply chain management, 2) knowledge of strategy management, knowledge of cost management, 4) knowledge of technology, and 5) knowledge of safety and environment management, and sustainable development goals.

### **Strategy Management**

*“Organizational strategy”* in the supply chain refers to *“business strategy”*. That business strategy must be in accordance in line with organizational strategy which aims mainly at creating added value and reducing the costs of manufacturing or services (Christopher & Ryals, 1999). There are three levels of strategy: 1) corporate-level strategy, 2) business-level strategy, and 3) functional-level strategy. These three levels of strategy are assigned to manage the process of operational work to be the same standard and the structure of process relationship, and performance criteria (Stephens, 2001), with the sales and operational work plans (Stahl & Wallace, 2012) which is one of the most important and necessary business processes of the supply chain management to improve the integrated operational work competency, and focus on the supply chain business (Porter, 1979) to create the differentiation strategy for customers with different quality and services in order to gain the business agility and efficiency to meet with customer demands and sustainable competitiveness.

### **Information Technology**

It involves the application of knowledge on information technology and innovation for operational work of the organizations e.g., computer technology, technology of telecommunication network and computer software to enhance the strategic relationship, and performance competency of supply chain. It helps the organizations meet a fast analysis and decision making effectively and it is a business strategy of management, purchasing, inventory tracking (Qrunfleh & Tarafdar, 2013), It is an instrument of the integrated supply chain management and cooperation strategy with information sharing to enhance the customers' satisfaction, namely 1) information sharing, 2) efficiency and accuracy of the information, and prompt information (Boonkasen, 2014) to help the organizations increase their production and service volumes effectively and use some techniques to analyze and improve the performance quality for the organization capabilities and competitive advantages.

### **Integraton**

It is similar to the systems theory focusing on the interactions and on the relationships between parts working together with alignment and capacity of performance measurement (Chikere & Nwoka, 2015), It also means the cooperation in and between the organizations to develop the strategies together (Huo et al., 2014) in order to develop and improve the organizations to achieve their business objectives through the integrated business running process with internal and external information sharing of the organizations, business administration of strategic relationship, operational work design in the organizations and

performance evaluation (Flynn et al., 2010), and it is a combination of the quality management system (ISO 9001), environmental management system (ISO 14001) and occupational health and safety management system to become work standards (Ribeiro et al., 2017).

## Objectives

The objective of this research was to develop the structural equation modeling of guidelines for successful supply chain management in industrial businesses.

## Hypothesis

The researcher assigned six hypotheses based on the objective and related literature as follows.

*H<sub>1</sub> The knowledge management variable directly influences the strategy management variable.*

The knowledge management is an important variable for the supply chain management affecting the organization competency and it must be transferred precisely and properly throughout the supply chain management (Kanat & Atilgan, 2014). The investment in information technology for data management and supply chain knowledge is an instrument for decision making to create an effective strategy of the cost management in order to perform immediately and effectively (Hofmann & Belin, 2011), and improve the supply chain efficiency for data management affecting the supply chain competency and organization performance outcomes (Qrunfleh & Tarafdar, 2015), as well as cooperate and ally with each other to improve the capabilities by applying the strategy of “*Lean and Agile*” in the supply chain.

*H<sub>2</sub> The knowledge management variable directly influences the information technology variable.*

The knowledge of supply chain is important to set up the information technology system linking to other organizations or sub-divisions such as manufacturing, operation, and procurement to enhance the operational work competency, reduce costs, and improve the customer services in order to share fast and effective information of supply chain (Kakhki & Gargeya, 2019), and information technology plays a critical role in the success of significant business transformation as a key enabler and source of competitive advantages. The Information Technology transformation is about making major changes to improve performance and capabilities for the organization aligned to business and supporting Information Technology strategies.

*H<sub>3</sub> The knowledge management variable directly influences the integration variable.*

The organizations have good performance outcomes and effective management of costs with information sharing and viewpoint development of knowledge management to enhance the competency of supply chain (Chen, 2015) both inside and outside the organizations or between the departments, or between the customers and the suppliers for appropriate decision making, trust, and cooperation (Saini, 2015), and efficiency of information sharing of the performance consequences of supply chain to enhance the relationship between the partnerships with the support of technology (Kuntamas & Shoommuangpak, 2020).

*H<sub>4</sub> The strategy management variable directly influences the information technology variable.*

To implement the strategies of a proper planning system in organizations, the executives should understand and choose the appropriate information technology which is an important factor influencing the improvement of business process leading the strategies to success (Swanier, 2016). The strategy of supply chain is related to the strategy of information technology in terms of enhancing the relationships between the strategies for operational work to perform smoothly, helps the organizations adapt themselves to their business quickly, and manage the information and performance outcomes of the supply chain effectively (Qrunfleh & Tarafdar, 2015).

*H<sub>5</sub> The strategy management variable directly influences the integration management variable.*

The competitiveness and profits of the organizations depend on the strategies to meet the marketing demands and the strategies of competition depend on the integrated relationship management to successively develop and improve the goods and services with international standards (Calle et al., 2015) focusing on the production quality and cost reduction throughout the supply chain (Chibba, 2017), the diversity of products and services (Sabet et al., 2017), and teamwork and supply chain relationships to enhance trust and organizational efficiency while reducing costs (Paiboonrungrui, 2012), to sustain competitiveness.

*H<sub>6</sub> The information technology variable directly influences the integration variable.*

The organizations have the information sharing real time information management through information technology, and coordination throughout the supply chain to develop the value of goods and services to meet the customers' demands immediately and increase the sustainable advantages (Vanpoucke et al., 2017). The implementation of information technology for the supply chain and the access of essential business information help meet the successful supply chain management (Saleh & Roslin, 2015) the strategies of competition show the relationships between the supply chain and organizational capabilities to enhance the competition advantages in both demand and supply for the development of goods and services. This is the key of supply chain management to better the goods and services (Calle et al., 2015).

## METHODOLOGIES

This study was designed as an inductive research with mixed methodology.

1. The qualitative research with the in-depth interview method: The population of this research consisted of nine experts. The purposive sampling method was used with the qualification criteria of experts according to the Doctor of Business Administration Program of the Industrial Business Administration Program under the Faculty of Business Administration at King Mongkut's University of Technology North Bangkok with three groups of experts including: three entrepreneurs or executives in business organizations, three representatives from government and related organizations; and 3 representatives from academic institutions.
2. The quantitative research method: The population used in this research was determined by industrial business sector with the partnership registration as a juristic person and still ongoing operation from the Department of Business Development in the total of 768,371 samples (Department of Business Development, Ministry of Commerce, 2020). The large enterprise refers to the industry with the fixed asset value over 200 million baht or over 200 employees of the employment. The medium and small enterprises mean as those industries with the fixed asset value not over 200 million baht or not over 200 employees of employment according to the ministerial regulations on employment schedule and value of fixed assets, B.E. 2545 (2002).

3. The qualitative research method with group discussion method to approve the model: The population of this research consisted of seven experts. The purposive sampling method was used with the qualification criteria of experts according to the Doctor of Business Administration Program of the Industrial Business Administration Program under the Faculty of Business Administration at King Mongkut's University of Technology North Bangkok.
4. The results of examining the Index of Item Objective Congruence (IOC) with the evaluation of the experts were deployed by the researcher as a guideline for the adjustment of the questionnaire and the IOC value was ranged from 0.60–1.00 for this research. The questionnaire was distributed after being approved by the experts for the try-out with the population of 30 people with the similar group of the population in the study.
5. The try-out results were analyzed by discrimination of each item and of each item with the checklist formula with the standard deviation and those with the Likert scale with the correlation coefficient. And the reliability of the item with the Likert scale was verified by the Cronbach's Alpha (Thongpracum & Silpjaru, 2020) through the Statistical Package for the Social Science for Windows (SPSS). The results of the discrimination analysis of each item showed that the standard deviation of the items was between 0.31 and 2.24 and the corrected item – Total Correlation analysis of the items with the Likert scale was between 0.31 and 0.90. The Cronbach's Alpha Coefficient of the reliability of the questionnaire was 0.99.

## RESULTS

The results of analyzing the guidelines for the successful supply chain management in the industrial business sector are as follows (Table 2).

It was found that the overall importance level of the guidelines for successful supply chain management in industrial businesses in the large enterprise was high with the mean of 4.22. The level of the knowledge management was high with the mean of 4.19, the level of the strategic management was high with the mean of 4.27, the level of the information technology was high with the mean of 4.25 and the level of the integration was high with the mean of 4.18.

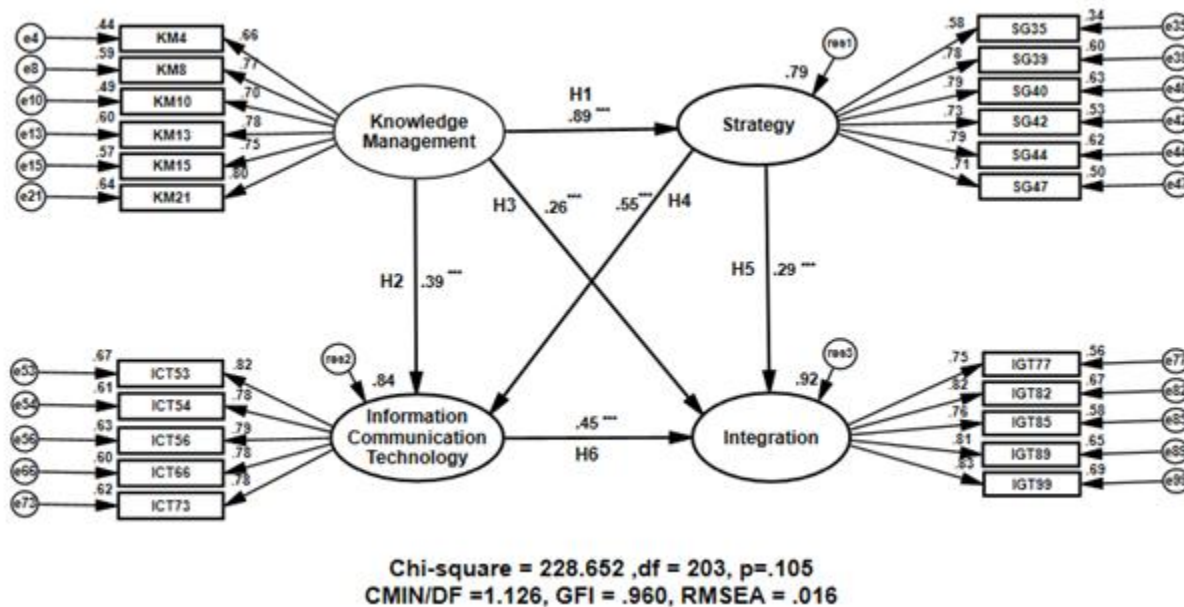
Guidelines for Successful Supply Chain Management in Industrial Businesses	The Large Enterprises			The Medium and Small Enterprises		
	$\bar{X}$	S.D.	Significant level	$\bar{X}$	S.D.	Significant level
Overall	4.22	0.45	High	4.00	0.52	High
1. Knowledge management	4.19	0.46	high	3.93	0.56	high
2. Strategic management	4.27	0.45	high	4.05	0.49	high
3. Information technology	4.26	0.50	high	4.10	0.58	high
4. Integration	4.18	0.54	high	3.97	0.56	high

It was found that the overall importance level of the guidelines for successful supply chain management in industrial businesses in the small and medium enterprises was high with the mean of 4.00. The level of the knowledge management was high with the mean of 3.93, the level of the strategic management was high with the mean of 4.05, the level of the information technology was high with the mean of 4.10 and the level of the integration was high with the mean of 3.97.

The results of the structural equation model analysis of the guidelines for the successful supply chain management in the industrial business sector are as follows (Table 3).

Evaluating the Data–Model Fit	Criteria	Reference
1. CMIN–p	Value > 0.05	Arbuckle (2016) IBM SPSS AMOS v.20
2. CMIN/DF	Value < 2	Arbuckle (2016) IBM SPSS AMOS v.20
3. GFI	Value > 0.90	Arbuckle (2016) IBM SPSS AMOS v.20
4. RMSEA	Value < 0.08	Arbuckle (2016) IBM SPSS AMOS v.20

The researcher then improved the model based on the modification indices in accordance with the recommendation of Arbuckle stating that the results of the data-model fit evaluation through the software package with theoretical principles were considered to eliminate each of the inappropriate observed variables and re-evaluate the model.



**FIGURE 4**  
**THE STRUCTURAL EQUATION MODEL OF GUIDELINES FOR SUCCESSFUL SUPPLY CHAIN MANAGEMENT IN INDUSTRIAL BUSINESSES**

This process was repeatedly conducted until all of the four statistics in the model passed the criteria and then it was considered as a complete structural equation model with the empirical information with the data-model fit. After having improved the model, it was found that the Chi-square probability was of 0.105 higher than 0.05, the relative Chi-square (CMIN/DF) was of 1.126 less than 2, the Goodness of Fit index (GFI) was of 0.960 high than 0.90, and the root mean square error of approximation (RMSEA) was of 0.016 less than 0.08. Therefore, it could be concluded that all of the four statistics passed the evaluation criteria. The structural equation model of the strategy of the successful supply chain management in the industrial business sector



after having approved was fit to the empirical information as shown above.

From Figure 4, it was found that the structural equation model of the guidelines for successful supply chain management in industrial businesses after having been improved, it was consisted of four latent variables which were divided into an exogenous latent variable, namely the knowledge management, and three endogenous latent variables e.g., the strategy management, the information technology, and the integration.

Variables	Estimate		R <sup>2</sup>	Variance	C.R.	P
	Standardized	Unstandardized				
<b>Knowledge Management</b>				<b>0.25</b>		
Strategy	0.89	0.73	0.79	0.04	11.29	***
Information Communication Technology	0.39	0.42	0.84	0.05	4.52	***
Integration	0.26	0.29	0.92	0.02	3.46	***
<b>Strategy</b>			<b>0.79</b>	<b>0.04</b>		
Information Communication Technology	0.55	0.73	0.84	0.05	6.06	***
Integration	0.29	0.39	0.92	0.02	3.36	***
<b>Information Communication Technology</b>			<b>0.84</b>	<b>0.05</b>		
Integration	0.45	0.45	0.92	0.02	5.42	***
<b>Knowledge Management</b>				<b>0.25</b>		
KM4	0.66	1.00	0.44	0.32		
KM8	0.77	1.14	0.59	0.22	15.10	***
KM10	0.70	1.10	0.49	0.30	14.02	***
KM13	0.78	1.12	0.60	0.20	15.26	***
KM15	0.75	1.06	0.57	0.21	14.86	***
KM21	0.80	1.13	0.64	0.18	15.64	***
<b>Strategy</b>			<b>0.79</b>	<b>0.04</b>		
SG35	0.58	1.00	0.34	0.32		
SG39	0.78	1.40	0.60	0.21	13.24	***
SG40	0.79	1.39	0.63	0.19	13.41	***
SG42	0.73	1.16	0.53	0.20	12.68	***
SG44	0.79	1.35	0.62	0.19	13.34	***
SG47	0.71	1.17	0.50	0.22	12.48	***
<b>Information Technology</b>			<b>0.84</b>	<b>0.05</b>		
ICT53	0.82	1.00	0.67	0.14		
ICT54	0.78	1.00	0.61	0.18	20.03	***
ICT56	0.79	0.99	0.63	0.17	20.45	***
ICT66	0.78	1.00	0.60	0.18	19.95	***
ICT73	0.78	1.01	0.62	0.18	20.20	***
<b>Integration</b>			<b>0.92</b>	<b>0.02</b>		
IGT77	0.75	1.00	0.56	0.23		
IGT82	0.82	1.13	0.67	0.18	9.19	***
IGT85	0.76	0.98	0.58	0.20	7.61	***
IGT89	0.81	0.97	0.65	0.15	8.87	***
IGT99	0.83	1.13	0.69	0.17	9.50	***

Note: \*\*\* Significant level at 0.001

It was found that the knowledge management with the variance of 0.25 directly influenced the strategy management with the standardized regression weight of 0.89 at the statistically significant level of 0.001. The squared multiple correlation ( $R^2$ ) of 0.79 with the variance of 0.04 directly influenced the components (Table 4).

For the information technology, it was found that the information technology with the standardized regression weight of 0.39 at the statistically significant level of 0.001 and the squared multiple correlation ( $R^2$ ) of 0.84 and the variance of 0.05 directly influenced the integration with the standardized regression weight of 0.26 and at the statistically significant level of 0.001, and the squared multiple correlation ( $R^2$ ) of 0.92 with the variance of 0.02.

For the strategy management, it was found that the strategy management with the variance of 0.04 directly influenced the information technology with the standardized regression weight of 0.55 at the statistically significant level of 0.001, and the squared multiple correlation ( $R^2$ ) of 0.84 with the variance of 0.05 directly influenced the integration with the standardized regression weight of 0.29 at the statistically significant level of 0.001, and the squared multiple correlation ( $R^2$ ) of 0.92 with the variance of 0.02.

For the information technology, it was found that the information technology with the variance of 0.05 directly influenced the integration with the standardized regression weight of 0.45 at the statistically significant level of 0.001 and the squared multiple correlations ( $R^2$ ) of 0.92 with the variance of 0.02.

For the elements of the logistics knowledge, it was found that the elements of the logistics knowledge directly influenced the collaboration network with the standardized regression weight of 0.54, at the statistically significant level of 0.001, and the squared multiple correlation ( $R^2$ ) of 0.88 with the variance 0.05.

## DISCUSSION

The crucial points of the results of the research on the guidelines for the successful supply chain management in the industrial business sector show that today there is a serious competition. Therefore, the exact demands of the competency enhancement for the supply chain management are essential for the competition in the world industry in order to increase the competitiveness of the Thailand industry in the world trade. The researcher discussed and summarized the solutions with the five related research references as follows.

1. From the research results, when comparing the components of the guidelines for the successful supply chain management in the industrial business sector classified by the sizes of the large and medium and small enterprises in general and by each item, it was found that they were different at the statistically significant level of .05 and in accordance with the research on "*The Impact of Supply Chain Collaboration on Performance in Automotive Industry: Empirical Evidence*" stating that the large enterprise has higher capability to work together in the supply chain than the medium and small enterprises. Therefore, the supply chain management enhances the smooth, fast and effective operation (Al-Doori, 2019), and in accordance with the research on "*Supply Chain Quality Management: Exploring Performance of Manufacturing Organizations*" stated that the efficiency of the supply chain management is important for the competitive advantages especially during the time of reducing the barriers of international trade and the rapid advancement of the information technology and affects the performance outcomes and the success of the organization at various levels such as the shortage of resources and knowledge of how to manage the efficiency and quality of supply chain operations and the adaptation to international standards for operational work and performance control including the effective performance evaluation (Chibba, 2017), and in accordance with the study on "*The Emerging Role of Knowledge in Supply Networks; The Impact of Purchasing and Supply Management*" claiming that under the market changes of the world supply chain, the technology advancement will change the

process of business operations, and the increase of information makes the acquired external knowledge become a strong point, and the organization's capabilities on procurement and supply chain management enhance the production competence and services to meet the demands of the most customers (Kilpi, 2017).

2. From the hypothesis test, it was found that the variables of knowledge management provided the standardized regression weight of 0.89, empirically indicating that the knowledge management affects the successful supply chain. The knowledge transfer and sharing of the effective supply chain are necessary for the business operations. This helps the organizations operate smoothly and adapt themselves to the customers immediately, and also in accordance with the on "*Effects of Knowledge Management on Supply Chain Management in the Clothing Sector: Turkish case*" summarizing that the knowledge management is the most important factor in managing and integrating successfully a strategic supply chain (Kanat & Atilgan, 2014), and in accordance with the research on "*A Framework for the Implementation of Knowledge Management in Supply Chain Management*" which concluded that the knowledge management is an important factor for competition and essential component of the supply chain management. The organizations should employ the employees with a good knowledge; competency and experience of the supply chain as well as the prompt application of their knowledge the capability because today the competition is not only between the organizations but also the supply chain. The organizations that focus on the supply chain management and implement it as an operational strategy to meet the highest customers' demands could enhance the organizations' competitiveness sustainably and successfully in the industrial business (Shakerian et al., 2016), and it is also in accordance with the study on "*An Auditing Framework for Knowledge-enabled Supply Chain Management: Implications for Sustainability*" stating that the knowledge management plays an important role in the supply chain management and there is a systematic framework integrating the knowledge management with the supply chain management to develop the evaluation approach of the operation's outcomes and the readiness of the organization to increase the potential of the supply chain management for the sustainable success (Daghfous & Zoubi, 2017).
3. The mean of the guidelines for successful supply chain management in industrial businesses on the strategy management was at the highest level of 4.16 which directly influenced the success of the organization in the highly competitive business environment and in accordance with the research on "*Project to Improve Knowledge Management and Key Business Results through the EFQM Excellence Model*" claiming that the traditional supply chain highly focused on the cost management (Calvo-Mora et al., 2015), but the traditional supply chain manage does not meet the current demands. Today the key of modern supply chain management to survive with competitive and performance efficiency improvement is considered as an essential factor with a clear goal and the same way of the supply chain operations (Silpcharu & Wantanakomol, 2017), and effective utilization of the resources and this is in accordance with the research on "*Strategies for Implementing a Successful Enterprise Resource Planning System*" claiming that the effective internal resource management influences the sustainable success of organization (Swanier, 2016).
4. For the guidelines of the successful supply chain management in the industrial business sector, it was that the mean of the information technology focusing on the security system of information technology was 4.27 which was considered as the most importance, and this is in accordance with the research on "*Impact of Information Security Initiatives on Supply Chain Performance*" (PN, 2014) stating that for the relationships between the supply chain partners, the business information is an essential asset for the supply chain management, information transfer, information sharing and data control. Therefore, the information security is vital to the supply chain management.
5. For the analysis of the relationships between the variables of guidelines of successful supply chain management in the industrial business sector, it was found that the relationships between the variables of the planning approach and integrated operational methods through the information technology with the variables of information and knowledge sharing exchange through the supply chain was the highest level of 0.688, and this is in accordance with the research on "*Information Systems for Supply Chain Management: A Systematic Literature Analysis*" stating that from the strategies at organizational, business and operational levels, operational-level strategy is as a business tool for the improvement of operational efficiency, cost reduction, profit and the delivery speed of goods and services (Daneshvar Kakhki & Gargeya, 2019), and this is also in accordance with the research on "*Information Systems for Supply Chain Management: A Systematic Literature Analysis*" stating that the information technology is an important tool for good collaboration across the supply chain partners to create the added value

for the customers (Kakhki & Gargeya, 2019), and this is also in accordance with the research on “*Arcs of Integration: An International Study of Supply Chain Strategies*” (Frohlich, 2001) and also in accordance with research on “*Supply Chain Integration, a Key Strategic Capability for Improving Product and Service Value Propositions: Empirical Evidence*” (Calle et al., 2015).

## CONCLUSIONS

The guidelines for successful supply chain management in the industrial business could be considered as a business goal. The organizations must focus on the supply chain management to improve the operational work process through the integrated supply chain with the implementation of the sale and operational planning strategies for the network of all departments in the organization with the same goal through the information technology systems such as the enterprise resource planning (ERP) system to work together in data analysis, share resources, make effective decisions, operate in the same way throughout the supply chain, enhance the supply chain knowledge and capability of the personnel and provide trainings both inside and outside of the organization organized by the institutions with the international standards such as The Purchasing and Supply Chain Management Association of Thailand or SCM Executives Thailand (APICS Education Provider), develop foreign language skills related their work and budget document for the information technology. These are considered as essential business tools to enhance operational efficiency throughout the supply chain to analyze big data, support decision making of executives, reduce complexity due to various factors such as the change in customers’ demands and technology, trade barriers and competitive pressures, which are important for the development of Industry 4.0.

## Recommendations for Further Research

1. From the research results, it was found that the large enterprise focuses on the supply chain management more than small and medium enterprises for the improvement of operational efficiency through the integrated supply chain based on the international standards to maximize the customers’ satisfaction and increase the profitability and sustainable competitiveness while the small and medium-sized industrial enterprises have the different characteristics of supply chain management with the shortage of operational readiness, which become an interesting point. Therefore, further research should focus on the successful supply chain management in the small and medium enterprises.
2. From the research results, it was found that the information technology system associated with the supply chain management. So, it becomes an interesting point to be studied in more details. The privacy and security guidelines for information sharing across the supply chains in the industrial businesses are not addressed in this research.
3. From the study, the interview of experts in the qualitative research was conducted to obtain important information to study the guidelines for the supply chain management in the industrial business sector. It was found that the most successful corporate executives from many organizations recommended that further study should focus on the guidelines for the sustainable supply chain risk management in the industrial business sector to see the perspectives of the organization’s readiness to business continuity plan and how to mitigate business risks associated with event or crisis affecting their organization competitiveness.

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