Guidelines for Managing Global Supply Chains for Industrial Businesses to Accommodate Global Economic Fluctuations

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ABSTRACT

In this era, the global economy experiences constant fluctuations. Efficient management of the supply chain is crucial for entrepreneurs to achieve success on a global level. This study aims to evaluate the guidelines for international supply chain management in the industrial business sector, considering the impact of global economic fluctuations. The research was further developed into a structural equation model that integrated both qualitative and quantitative research methods. A quantitative survey was conducted using a questionnaire that collected data from 500 executives involved in international import and export activities in the industrial business sector. The analysis utilised descriptive, reference, and multiple statistics. The research findings highlight the significance of international supply chain management guidelines in the industrial business sector during periods of global economic fluctuations. Here is the ranking of the four elements: 1) Technology ($\overline{X}$ = 4.56): the most crucial aspect is planning the use of information technology systems for supply chain operations in conditions consistent with the organization's strategic plan. 2) Communication Integration ($\overline{X}$ = 4.43), the significant aspect is developing skills and abilities to create effective relationship management strategies with trading partners in the supply chain system. 3) Management Competency ($\overline{X}$ = 4.39): the most crucial aspect is setting challenging production indicators to drive changes in the working behaviour of personnel within the organization. 4) Economic Environment ($\overline{X}$ = 4.37): the most important aspect is to follow up on the economic situation both domestically and abroad to prepare a business plan. The results of the hypothesis test suggest that there is no significant difference in the importance given to international supply chain management guidelines by small and medium-sized businesses and large businesses during periods of global economic fluctuation, at a significance level of 0.05. In addition, the structural equation model that was developed successfully met the evaluation criteria and aligned with the empirical results. The statistical analysis yielded a chi-square probability level of 0.089, a relative chi-square of 1.108, a concordance index of 0.950, and a root mean square error of approximation of 0.015.

KEYWORDS: International Supply Chain, Economic fluctuation, industrial businesses, Structural Equation Modelling, Supply Chain Management.

INTRODUCTION

Over the past three to four decades, governments and businesses have grappled with the swift

economic transformations brought about by advancements in communications technology, telecommunications, transportation, and other factors. Nevertheless, the rise of cooperation through global production chains, commonly referred to as "Global Supply Chain Pressure Index (GSCPI)" 2023), has had a significant impact on reshaping global trade. This interconnected network encompasses all stages of the supply chain, ultimately transforming the way trade operates (Economics, 2023; Fernando & Wulansari, 2021). Various industries such as processed food, clothing, electrical and electronics, cars, and aeroplanes highly value cost management throughout the entire process. These industries have production networks and customers spread all over the world, making them part of a global supply chain. There are several Thai entrepreneurs who possess the potential to contribute to the production and international transportation of goods in various industries (Apiyuk, 2020).

The impact of global economic volatility on supply chain management is substantial. Changes in the market can cause disruptions in supply chains, resulting in delays, higher expenses, and decreased customer satisfaction. Economic changes influence demand, sales, and production levels. In order to effectively address these challenges, it is crucial for supply chain managers to establish and maintain open lines of communication with their partners. They should also set clear production goals, closely monitor economic conditions, and align their IT systems with their overall strategic plans. These strategies can assist organisations in effectively navigating economic volatility.

According to a report from the Argyropoulou (2019) the global gross product (real GDP growth) went through notable ups and downs between 2017 and 2022, with periods of decline and rapid growth (Nitiwong et al., 2022). This level of instability has continued for the past six years. Meanwhile, the Thai economy faced difficulties and potential dangers due to the limitations and lasting effects of immediate economic stimulus measures. As a result, the Thai economy experienced a slower recovery than expected. The IMF's evaluation of Thailand's gross product (real GDP growth) mirrors this pattern of fluctuation over the same period, in line with the global economic volatility depicted in Figure 1.

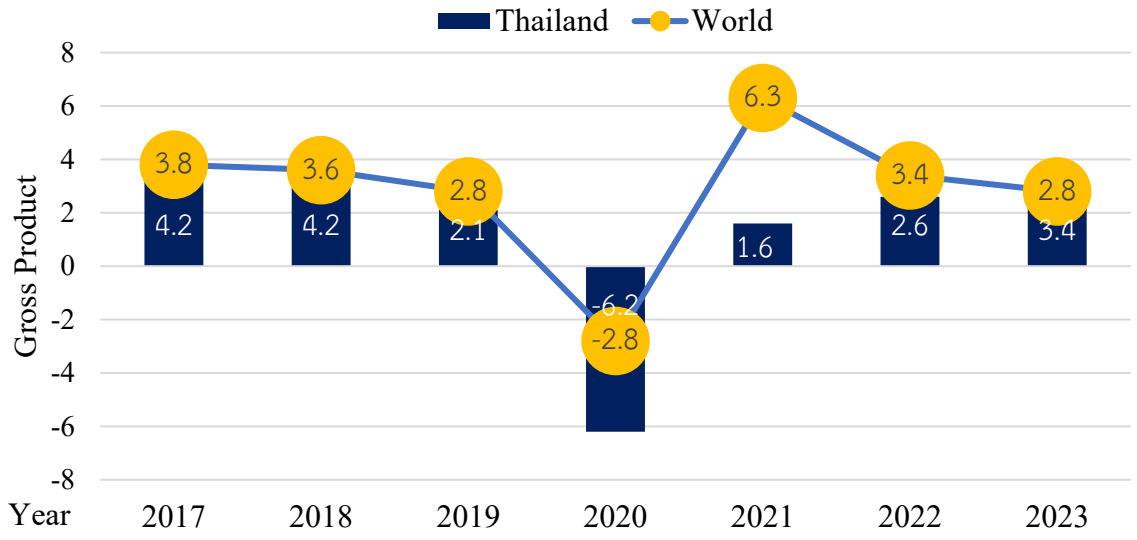

Figure 1: Trends in Fluctuations in the World Economy and the Thai Economy Which Based on the Rate of Economic Expansion From 2017 **to** 2022 (**IMF,** 2023).

There is expected to be significant fluctuation in the Global Supply Chain Pressure Index

(GSPI) from 2018 to 2022. According to the data, the global supply chain tension index reached its highest point in five years in 2021, with a value of 4.32. However, it decreased significantly to 0.91 in 2022, as illustrated in Figure 2.

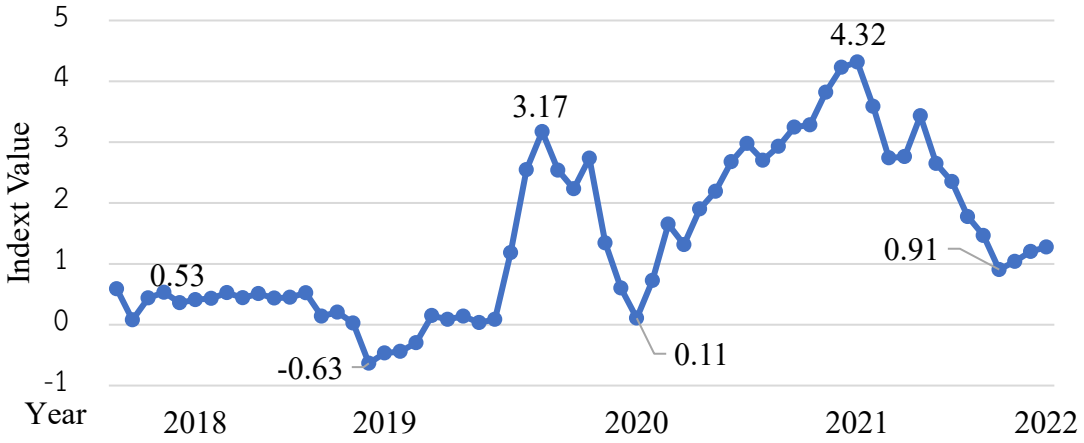

Figure 2: The Global Supply Chain Pressure Index (GSCPI) Tends to be Very Volatile During the Year (2018-2022).

It is evident that the worldwide economic downturn and disruptions in supply chains posed significant challenges to the recovery of the economy following the COVID-19 pandemic. Numerous businesses have faced difficulties in handling their supply chains, such as higher product and raw material expenses, rising energy costs, delays in transportation and logistics, and shortages in different components. Despite some initial improvements in the global supply chain situation in 2023, it continues to be impacted by the resurgence of the COVID-19 virus and the ongoing Russian-Ukrainian war. This intensifies the existing supply chain pressures, as indicated by the Global Supply Chain Pressure Index (GSCPI) in 2023. As a result, the researcher is intrigued by the exploration of guidelines for effectively managing international supply chains in the face of significant economic volatility within the industrial business sector. Participation in the global supply chain is considered essential for effective supply chain management in this sector, with the goal of gaining a sustainable competitive advantage and improving the economic competitiveness ranking index to meet future objectives.

LITERATURE REVIEW

The previous concepts and theories of international supply chain management guidelines for the industrial business sector in situations of global economic volatility can be categorised into four elements:

1 The technology component involves the utilization of information technology knowledge and innovations to enhance the organization's operations across the supply chain, resulting in improved performance and efficiency. Sharing information within the supply chain is crucial for reducing uncertainty and improving the organization's ability to meet customer needs accurately. A recent study by Climent & Haftor (2021) conducted an empirical analysis of business operations utilizing digital technology. There is a growing trend among businesses to explore the potential of digital technology as a means to enhance their organisational capabilities. However, determining the value of the investment goes beyond just considering technology. However, the individuals within the organisation who must

acquire, comprehend, and apply digital technology play a crucial role. Executive personnel have a crucial role in driving change by leveraging their management expertise in digital technology to effectively utilise digital tools that align with the organisation's business model, resulting in the development of a distinctive business approach.

2. The communication component of integration actually refers to the smooth and efficient exchange of information among stakeholders in a supply chain system. Efficient coordination and management are accomplished by utilising indicators like language proficiency, clear messaging, regular communication, and transparency. Through the consolidation of existing knowledge, organisations create a centralised system that promotes universal access to information. This not only enhances personal development but also improves efficiency. This greatly improves an organisation's competitive advantage. In a recent study, Onjira (2021) delved into the response of logistics companies in Thailand to the COVID-19 crisis. The aim was to gain insights into the different factors that influenced their strategies and identify best practices. Strategic recommendations have been formulated to help logistics companies improve or adjust their services during times of crisis, such as the COVID-19 pandemic or other comparable circumstances.

3. The operational competency component focuses on achieving efficiency and effectiveness in managing organisational resources. These skills encompass various aspects of managing operations, such as planning, control, technical expertise, ensuring quality, and fostering positive relationships. An optimised and streamlined operating system is essential for minimising operational inefficiencies. In a recent study, Hofer (2020) emphasised the growing trend of organisations forming strategic alliances to enhance their competitiveness. These partnerships aim to improve competitiveness through resource sharing and utilization. Collaborative partnerships, known as joint ventures, are widely used in the business world. They allow partners to work together to increase their market presence and develop new technologies.

Nevertheless, numerous organisations encounter difficulties in achieving successful joint ventures as a result of trust issues, hesitancy to share sensitive information, and an excessive focus on maintaining organisational reputation. In their study, Sunee & Silpcharu (2022) examined the effects of guidelines on the management of automotive part production with the aim of achieving long-term success. They highlighted the importance of improving labour skills in the automotive parts manufacturing industry. Meeting customer demands goes beyond simply delivering the product; it also requires sticking to a designated timeline. Therefore, the cultivation of labour skills is essential for meeting customer demands. It is critical for industrial entrepreneurs to place a strong emphasis on enhancing labor skills. Focusing on improving business organisations and incorporating modern technology into the production process can achieve this. As a result, it is crucial for the automotive parts manufacturing sector to ensure that workers have the required skills, knowledge, and abilities to successfully handle new production processes and technologies, and also to adjust to changes in product characteristics. Thus, improving skills is crucial for organisational growth and long-term success.

4 The Economic Environmental component pertains to factors external to the organisation that are connected to economic conditions and impact the organization's operational outcomes. Various factors impact economic fluctuations and the probability of supply chain disruption risks, including tax policies and fluctuations in import-export interest rates and currency. In a study conducted by Sunee (2021), the focus was on analysing various strategies aimed

at minimising logistics expenses. The findings revealed that transportation emerged as the most critical and costly aspect of logistics operations. The size and weight of each shipment are in line with the transport cycle. Even with the advancements in trading, online platforms still offer a convenient way to make payments. The process of delivering goods from seller to buyer relies heavily on transportation for determining the size and weight of the product, processing new orders, and allocating additional space for efficient product delivery to customers. This can significantly minimise transportation expenses. However, it is important for entrepreneurs to take into account additional factors, including transportation routes, planning, and insurance for goods during transportation. Entrepreneurs can establish a distribution centre to efficiently send products along a consistent route by utilising technology to monitor products and transportation.

Research objectives

The main objective of this study is to examine supply chain management guidelines in the business sector across various industries on a global scale, considering fluctuations in the global economy. The research aims to achieve the following specific objectives:

1. To analyse the structure and operational characteristics of industrial businesses that engage in international supply chain management.
2. To identify the key elements of supply chain management guidelines in the business sector across industries on an international scale.
3. To create a structural equation model that can be used to guide supply chain management in the business sector across industries on an international scale.

Research hypothesis

Investigating guidelines for supply chain management in the business sector across industries on a global scale amidst global economic fluctuations yields the following hypotheses:

H1*: Technology components exert a direct influence on Communication Integration. Piyachat et al. (2023) found that societal and business changes have increased competition, leading customers to seek higher-quality products and services. Modern communication technologies improve communication and coordination within and between organizations. Employees are encouraged to actively participate in operations, marketing, and customer care to improve work efficiency, lower costs, discover new growth opportunities, and ensure long-term stability for the organisation. The achievement of management goals is contingent upon sincerity, determination, and conscientiousness in performing individual duties. The consistent dedication to duty produced valuable outcomes.*

H2: *Technology components exert a direct influence on economic and environmental components. Pensri (2023) found that economic fluctuations present challenges for marketing management due to increased competition. A recommended approach to tackling this issue is to implement a growth strategy that involves developing new products for existing markets and expanding into new markets. This approach enables the fulfilment of diverse customer needs and distinguishes products from competitors.*

H3: *Technology components directly impact the operational competency component. Supot et al. (2021) investigated the relationship between information technology and service innovation in the logistics industry in Thailand. The study found that corporate executives prioritise the use of digital technology to foster creativity, as it significantly contributes to service*

innovation. Therefore, it is recommended that logistics service providers in Thailand empower their employees to contribute ideas for product and service development through the use of digital technologies. Furthermore, organisational executives should foster employees' interest in digital technology and support the growth of personnel potential within the organisation. This approach facilitates efficient logistics management and prioritises the integration of contemporary digital technology. Executives should prioritise the implementation of new programmes and applications to enhance work efficiency and make necessary improvements to these tools.

H4: *Communication Integration directly influences the components of the economic environment. Sirinthip & Suphatthasak (2022) conducted a study on innovations in managing small and medium-sized businesses in the digital economy era. Their research found that economic and social systems heavily depend on information and communications technology (ICT) infrastructure, which includes communication, production, consumption, electronic commerce, transportation, and logistics. The private sector should play a leading role in promoting economic and social development, while the state acts as a facilitator and promoter. This entails implementing systematic incentives for the private sector and improving public sector efficiency. It is essential to establish digital policies for the economy and society, as well as national development guidelines that focus on the development and utilisation of digital technology.*

H5: *Operational competency components have a direct influence on Communication Integration. Tarigan et al. (2021) found that competency management is crucial for supply chain integration. Executive competencies play a crucial role in organisational development by promoting efficient integration within the supply chain. The integration of information and forecasts across different components of the supply chain facilitates improved supply chain quality and operational capabilities. The presence of management competency enhances the efficiency and effectiveness of supply chain operations by promoting collaboration and coordination among organizations within the supply chain.*

H6: *The study of the SEM model for supply chain management shows no notable disparities when categorized by the size of the company. Nitiwong et al. (2022) investigated the effects of the COVID-19 pandemic on logistics management in Thailand, specifically focusing on its impact on product supply chains in both upstream and downstream sectors. The upstream segment, responsible for raw material procurement, faced shortages, particularly for materials imported from countries heavily impacted by COVID-19. These disruptions have led to factory closures. On the other hand, changing consumer demand due to increased awareness and responsiveness to information creates downstream challenges. The variability in demand patterns caused by these dynamics has an impact on supply chain operations in organisations of all sizes.*

RESEARCH METHODOLOGY

This research utilises a hybrid approach that combines inductive research and mixed methodology. In order to conduct the qualitative research, researchers employed in-depth interview techniques with a total of nine experts. The panel of experts comprises three entrepreneurs, three business development executives from reputable organisations, three individuals from government and related sectors, and three representatives from academic institutions. The citation, reference, and in-line citations are not subject to modification. Chantruprakakul et al. (2023) The researchers created an interview guideline consisting of four elements: technology component, Communication Integration component, management competency elements, and economic environment elements.

The researchers developed an evaluation form, known as the consistency index between questions and research objectives (IOC), to facilitate quantitative research. Five experts rated the form, and the values ranged from 0.60 to 1.00 (>0.50). The researchers then administered a try-out questionnaire and analysed the discriminant power values for each item, which ranged from 0.32 to 2.87 (>0.30). The alpha coefficient (alpha) was calculated to determine the reliability of the questionnaire, yielding a value of 0.99 (>0.80). The researchers recruited executives from small- to large-sized industrial businesses and randomly selected 500 participants using the lottery method (Sawangrat, 2020). The researchers employed the SPSS package to analyse the primary data using descriptive and inferential statistics. Additionally, they utilised the advanced statistical data analysis programme AMOS to conduct structural equation model analysis. The consistency of the structural equation model was evaluated using four criteria: 1) The chi-square probability level value (CMIN-p); 2) The Relative Squareness Value (CMIN/DF); 3) The Goodness of fit index (GFI); 4) The Root Mean Square error of approximation (RMSEA) (Arbuckle, 2011).

The panel consisted of 11 experts to validate the model using group discussion techniques.

RESULTS

Table 1. Guidelines for Managing Global Supply Chains in a Period of Global Economic Volatility, classified by industry business size.

Components	Small and Medium-Sized			Large size		
	$\bar{X}$	SD.	Level of Importance	$\bar{X}$	SD.	Level of Importance
Overall	4.42	0.19	High	4.45	0.20	High
1. Technology	4.54	0.26	Highest	4.59	0.26	Highest
2. Communication Integration	4.41	0.24	High	4.44	0.25	High
3. Operation Competency	4.38	0.26	High	4.41	0.25	High
4. Economic Environmental	4.37	0.24	High	4.38	0.28	High

The research findings suggest that larger industrial businesses prioritise international supply chain management guidelines in the industrial sector, especially during global economic fluctuations. The average importance rating for large businesses was 4.45, compared to 4.42 for small and medium-sized industrial businesses. Throughout all research areas, it was observed that,

Large industrial business:

The technology components were found to be the most crucial aspect, with an average score of 4.59. The Communication Integration components were deemed highly important, receiving an average score of 4.44. The Operational competency components received a high average score of 4.41. The Economic Environmental components were considered highly important, with an average score of 4.38.

SMALL AND MEDIUM-SIZED INDUSTRIAL BUSINESSES:

The average rating for technology components is 4.54, which is the highest. The Communication Integration components are highly important, with an average rating of 4.41. The operational competency components have a rating of 4.38. The economic and environmental components are deemed significant, with an average rating of 4.37.

Taking into account changes in the world economy, research on statistical values for comparing differences in the importance levels of guidelines in supply chain management across industries on an international level came up with a range of results. We found no significant statistical difference when categorising by business size. Nevertheless, the evaluation of the structural equation modelling (SEM) model yielded mixed results. The relative chi-square values (CMIN/DF) were 0.089, indicating a non-significant fit. The consistency index (GFI) was 0.950, surpassing the threshold of 0.90. The root mean square error of approximation (RMSEA) was 0.015, below the cutoff of 0.08. The four statistics evaluated met the criteria, but the results were inconclusive, suggesting a lack of consistency with empirical data.

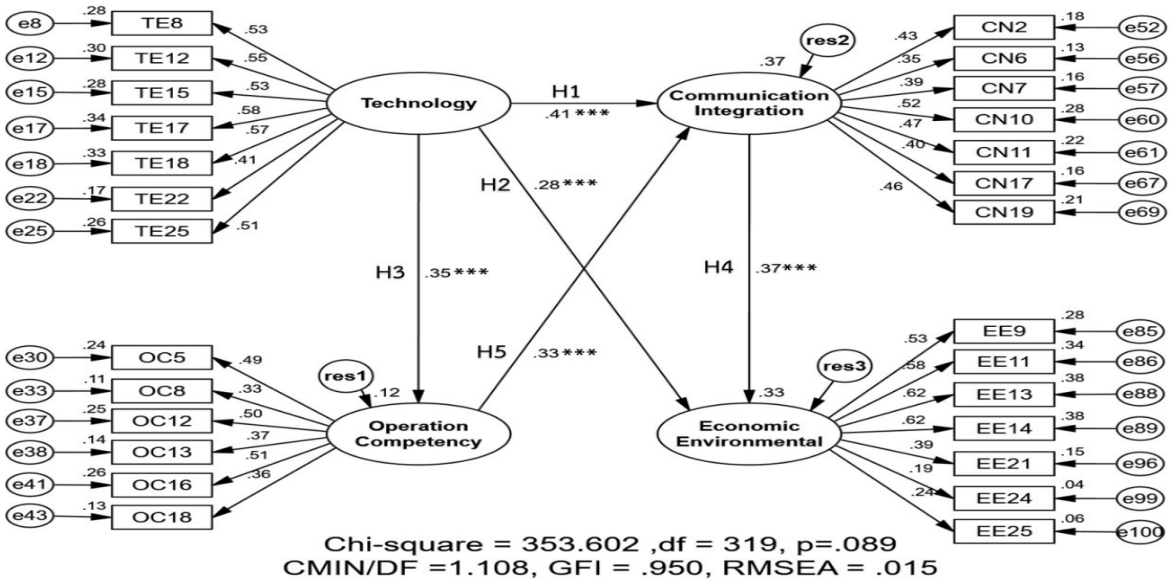

Figure 4. A structural equation model for the management of international supply chains under global economic fluctuations, using Standardized Estimate model.

The results of the hypothesis testing analysed the causal influence between the latent variables in the structural equation model. The structural equations for international supply chain management of the industrial business sector under global economic fluctuation have five hypotheses, the results are as follows:

H1: *According to the research hypothesis, technology components exhibit a significant direct impact on communication integration components, with a standardized regression weight of 0.41 and a statistical significance level of 0.001.*

H2: *The research hypothesis suggests that technology components have a considerable direct influence on economic environmental components, with a standardized regression weight of 0.28 and a statistical significance level of 0.001.*

H3: *The research hypothesis posits that technology components exhibit a substantial direct impact on operational competency components, with a standardized regression weight of 0.35 and a statistical significance level of 0.001.*

H4: *The research hypothesis indicates that communication integration components have a significant direct influence on economic environmental components, with a standardized regression weight of 0.37 and a statistical significance level of 0.001.*

H5: *Statistically significant level of 0.001 is achieved with a standardized regression weight of*

0.33 for operational competency components, supporting the research hypothesis.

Table 2: Demonstrates the Results of Statistical Analysis of an Enhanced Structural Equation Model.

Variables	Estimate		R^2	Variance	C.R.	P
	Standard	Unstandardized				
Technology				0.07		
Communication- Integration	0.41	0.37	0.37	0.03	4.65	***
Economic- Environmental	0.28	0.30	0.33	0.05	3.45	***
Operation- Competency	0.35	0.35	0.12	0.06	4.93	***
Communication Integration			0.37	0.03		
Economic- Environmental	0.37	0.44	0.33	0.05	3.90	***
Operation Competency			0.12	0.06		
Communication - Integration	0.33	0.30	0.37	0.03	3.60	***
Technology				0.07		
TE8	0.53	1.00	0.28	0.18		
TE12	0.55	1.02	0.30	0.17	8.44	***
TE15	0.53	1.01	0.28	0.18	8.25	***
TE17	0.58	1.08	0.34	0.16	8.74	***
TE18	0.57	1.10	0.33	0.17	8.63	***
TE22	0.41	0.81	0.17	0.22	6.97	***
TE25	0.51	1.03	0.26	0.21	8.09	***
Communication Integration			0.37	0.03		
CN2	0.43	1.00	0.18	0.25		
CN6	0.35	1.10	0.13	0.39	5.32	***
CN7	0.39	1.09	0.16	0.36	5.69	***
CN10	0.52	1.40	0.28	0.29	6.60	***
CN11	0.47	1.29	0.22	0.32	6.28	***
CN17	0.40	0.90	0.16	0.24	5.72	***
CN19	0.46	1.06	0.21	0.24	6.18	***
Operation Competency			0.12	0.06		
OC5	0.49	1.00	0.24	0.22		
OC8	0.33	0.83	0.11	0.37	4.98	***
OC12	0.50	1.14	0.25	0.26	6.33	***
OC13	0.37	0.78	0.14	0.25	5.39	***
OC16	0.51	1.23	0.26	0.28	6.40	***
OC18	0.36	0.85	0.13	0.33	5.23	***
Economic Environmental			0.33	0.05		
EE9	0.53	1.00	0.28	0.20		
EE11	0.58	1.19	0.34	0.21	3.45	***
EE13	0.62	1.17	0.38	0.17	8.77	***
EE14	0.62	1.17	0.38	0.17	8.74	***
EE21	0.39	0.78	0.15	0.26	6.50	***
EE24	0.19	0.33	0.04	0.23	3.49	***
EE25	0.24	0.47	0.06	0.28	4.35	***

** Statistically significant at the level 0.001

The SEM model is used to guide supply chain management in various industries on a global scale, considering international economic fluctuations. The model consists of four latent

variables, including one exogenous latent variable (the technology component) and three endogenous variables (Communication Integration, Operation Competency, and Economic Environmental Elements).

There are seven observational variables in the Technology component, arranged from highest to lowest in order of standard regression weight:

1 Establish agreements with key clients and streamline the flow of information through the utilization of electronic labels like Barcodes, QR codes, or product packaging identification (TE17). According to the weights obtained through Standardized Regression, the R2 value was 0.34, the variance was 0.16, and the squared multiple correlation was 0.58.

2 The implementation of the Container Tracking system allows for immediate access to detailed information regarding product shipments, facilitating proactive responses to unforeseen circumstances (TE18). The standardized regression weight value was 0.57, which was statistically significant ($p < 0.001$). The R2 value was 0.33 and the variance was 0.17, both of which were also statistically significant ($p < 0.001$).

3 The organization should establish collaborative partnerships with technology startups to develop automation systems (TE12). The R^2 value is 0.30, the variance is 0.17, and the squared multiple correlation value is 0.55. A statistically significant level of 0.001 was observed for the standardised regression weight value.

4 The implementation of a product data traceability system using electronic labels, such as barcodes or QR codes, can enhance operational efficiency (TE5). The standardised regression weight is 0.53 (C.R. = 8.245), with an R^2 value of 0.28 and a variance of 0.18.

5 To improve the efficiency of product distribution, it is recommended to implement an automated warehouse system (TE8). The weight value (Standardised Regression Weight) is 0.53 (C.R. = 0.000), with a correlation coefficient (R^2) of 0.28 and a variance of 0.18.

6 The database system enabling remote work for employees (TE25) had a weight value of 0.51, indicating statistical significance at the 0.001 level. The squared multiple correlation value (R^2) of 0.26 and variance of 0.21 indicated this.

7 The budget should be allocated for the acquisition of modern computer equipment to support supply chain operations (TE22). The standard regression weight was found to be statistically significant at 0.41. The correlation, as measured by squared multiples (R^2), was 0.17, and the variance was 0.22. A statistically significant difference was observed in the results at a significance level of 0.001.

The Integration of Communication elements involved arranging seven observational variables based on their standardised regression weight values, from highest to lowest:

1 The CN10 system, developed for supply chain management and communication, has a significant standardised regression weight value of 0.52 at the 0.001 level. The system displays a squared multiple correlation (R^2) of 0.28 and a variance of 0.29.
2 Create a communication strategy that is consistent with technology for clarity, speed, and timeliness (CN11). The square multiple correlation coefficient (R2) value is 0.22, the variance value is 0.32, and the standard regression weight is 0.47, with statistical

significance at 0.001.

3 In order to facilitate open and meaningful discussions about all stories (CN19), it is crucial to cultivate an environment that encourages independent communication, transparency, and clarity. The study reported a standardised regression weight of 0.46, a multiple correlation coefficient (R2) of 0.21, a variance coefficient of 0.24, and a statistically significant level of 0.001.

4 Communication systems are commonly used for remote meetings, data sharing, and international transfer. The regression weight (CN2) is 0.43, the squared multiple correlation (R^2) is 0.18, and the variance is 0.25.

5 The standardised regression weight value for CN17 is 0.40, with a multiple correlation squared (R^2) of 0.16 and a variance value of 0.24. The samples demonstrate high accuracy. The standardised regression weight value is statistically significant at the 0.001 level, with a value of 0.40.

6 Joint performance monitoring as a team can be achieved through conducting a meeting with operators across the supply chain (CN7). The weight value for Standardised Regression was 0.39, R^2 was 0.16, and the variance value was 0.36.

7 A supply chain management policy provides operational guidance and is communicated to executives and employees (CN6). The standardised regression weight values for the proposed model are 0.35, with a statistically significant p-value of 0.001. In addition, the system displays an R^2 value of 0.13 and a variance of 0.39.

The operational competency component consists of six observational variables, ranked in descending order of weight (Standardised Regression) as follows:

1 Implementing a maintenance plan that incorporates routine machine inspections and predictive maintenance techniques can aid in predicting equipment conditions. The weight value for this approach was 0.51, which was statistically significant at the 0.001 level. The R^2 value was 0.26 and the variance was 0.28.

2 The promotion of resource efficiency through the principles of reduction, reuse, and recycling is advocated to minimise environmental impacts (OC12). The weight value in the standard regression was 0.50, the squared multiple correlation value (R^2) was 0.25, and the variance was 0.26.

3 Advocate for initiatives targeting cost reduction in production and transportation (OC5). The weight value (Standardised Regression) was 0.49, with an R^2 value of 0.24 and a variance level of 0.22.

4 The study found that improving production standards to optimise international supply chains (OC13) had a statistically significant effect, with a Standardised Regression Weight of 0.37, at the 0.001 level. The coefficient of determination (R^2) was found to be 0.14, indicating a weak relationship between the variables. The variance was determined to be 0.25.

5 The objective is to develop a versatile production system that can effectively respond to dynamic environments while remaining consistent with the organization's objectives and vision (OC18). The standardised regression weight was found to be significant ($\beta = 0.36$, $p < 0.001$), explaining 13% of the variance ($R^2 = 0.13$) in the model.

6 The OC8 system, which manages raw material flow in the production process to achieve production speed balance under Lean Manufacturing's Line Balance approach, has a statistically significant Standardised Regression Weight value of 0.33 (p 0.001). The system displays a squared multiple correlation value (R^2) of 0.11 and a variance of 0.38.

Seven observational variables are ranked from highest to lowest in weight (Standardized

Regression) as part of the Economic Environment component:

1 Implement FX Hedging to mitigate currency volatility risk (EE13), with a weight of 0.62 (C.R. = 8.765). The R2 value was 0.38, the variance was 0.17.
2 Develop economic indicators and forecasts for strategic planning (EE14), with a weight of 0.62 (C.R. = 8.744). The R2 value was 0.38, the variance was 0.17.
3 Align organizational structure with current needs (EE11) with a weight of 0.58. R2 value is 0.34, variance is 0.21.
4 Establish guidelines for navigating disruptive innovation (VUCA World) (EE9) with a weight of 0.53. The R2 value was 0.28, the variance was 0.20.
5 Assess container usage for efficient product delivery (EE21) with a weight of 0.39. R2 value is 0.15, variance is 0.26.
6 Utilize forward contracts for currency risk management (EE25) with a weight of 0.24. R2 value is 0.06, variance is 0.28.
7 Conduct transactions in multiple currencies for risk diversification (FCD) (EE24) with a weight of 0.19. The R2 value was 0.04, the variance was 0.23.

The study reveals that global economic volatility has a substantial influence on supply chain management. The impact can be observed through increased costs, reduced efficiency, and heightened risk. Economic fluctuations can cause supply chain disruptions, leading to delays in delivery and higher costs (Park & Li, 2021). During economic volatility, suppliers may face difficulties in meeting demand due to financial challenges, transportation disruptions, or other issues. This can result in delays in delivery, increased transportation costs, and reduced customer satisfaction.

Furthermore, economic conditions can impact the demand for goods and services, leading to variations in sales volumes and production levels. Supply chain managers may need to modify production schedules and inventory levels in response to market changes, leading to higher costs and reduced efficiency.

Economic volatility can increase the risk of managing a global supply chain. Factors such as exchange rate fluctuations, trade policies, and political instability can affect import and export costs as well as disrupt supply chain operations. Supply chain managers must be prepared to address risks and ensure supply chain continuity (Ruamphon et al., 2022).

The impact of economic volatility on supply chain management is multifaceted and has significant implications for global businesses. Understanding the impact of economic volatility on supply chain management enables businesses to develop risk mitigation strategies and ensure supply chain continuity.

CONCLUSION AND RECOMMENDATIONS

To manage international supply chains in industrial businesses, four key variables must be considered in response to global economic fluctuations. Technology is the most critical component, followed by communication integration, operation competency, and economic environmental factors. The results of hypothesis testing indicate that technology has a significant impact on Communication Integration in supply chain management, based on empirical data. In today's highly competitive and rapidly changing business environment, companies in different industries need to adjust their marketing strategies to stay ahead of the competition. The adoption of technology improves communication efficiency in organisations

and supply chains. The ability to quickly exchange information both within and outside of an organisation is facilitated by research conducted by Dehgani & Navimipour (2019). Furthermore, the extensive use of technology in the supply chain improves operational efficiency by incorporating digitization and automation integration in procurement, manufacturing, inventory management, and retail sales (Fatorachian & Kazemi, 2021).

During global economic fluctuations, guidelines for managing international supply chains in industrial businesses emphasize effective information technology management. The key considerations include the following.

- Government advice and economic indicators are utilised to guide decision-making and mitigate risks. One can employ forward contracts to mitigate the impact of currency fluctuations.
- The process involves conducting risk assessments to identify potential disruptions in the supply chain and establishing alternative sources for raw materials.
- Collaborating with technology startups to automate and navigate in the VUCA era requires effective communication strategies and backup plans.
- Financial institutions offer guidance on how to manage exchange rate risk through FX hedging and multicurrency transactions.

Bulk transportation methods and container tracking systems are employed to address container shortages and ensure the safety of products during transportation.

The study has limitations in terms of a small sample size and a focus on the industrial business sector. These findings offer valuable insights into international supply chain management guidelines during global economic fluctuations.
Further research could investigate industries and regions that are especially susceptible to supply chain disruptions during periods of economic volatility. The COVID-19 pandemic has exposed the susceptibility of industries like healthcare and pharmaceuticals to supply chain disruptions. Furthermore, companies operating in areas with significant political instability or environmental risk may encounter distinct difficulties in effectively managing their supply chains.

Furthermore, further investigation could examine the effects of technological advancements and emerging trends in supply chain management during times of economic volatility. The growing adoption of artificial intelligence, blockchain technology, and other digital tools may provide fresh prospects for enhancing supply chain optimisation and risk management.

Future research can explore various areas to enhance our understanding of the impact of global economic volatility on supply chain management. Businesses can enhance their supply chain management strategies during economic uncertainty by exploring these areas.

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