

# The Relationship between Supply Chain Digitalization and Organizational Performance among the Electronics and Electrical Multinational Corporation Manufacturing Industries in Penang

Cher Hao Xuan<sup>1</sup>, Nor Kamariah Kamaruddin<sup>1\*</sup>

<sup>1</sup> Department of Management and Technology, Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, 86400 Batu Pahat, Johor. MALAYSIA

\*Corresponding Author: [Nkamariah@uthm.edu.my](mailto:Nkamariah@uthm.edu.my)  
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## Abstract

In the new global economy, organizational performance in Electronics and Electrical (E&E) manufacturing industries has come to the forefront of business concerns, the awareness of Supply Chain Digitalization remains low among E&E manufacturing companies in Malaysia, posing a challenge to their organizational performance. Therefore, the purpose of the study is to identify the relationship between supply chain digitalization and organizational performance among the E&E multinational corporation (MNC) manufacturing industries in Penang. The quantitative method is used in this study which the questionnaire survey was distributed among the E&E MNC manufacturing industries. The target population consisted executive level such as professional, top-level managers, middle-level managers, lower-level managers, and professional in the E&E MNC manufacturing industries. The study comprises a sample size of 80 respondents, and the data collected through the questionnaire was analyzed utilizing SPSS for comprehensive insights and findings. The result showed a strong correlation relationship ( $r= 0.741$ ) between supply chain digitalization and organizational performance among E&E MNC manufacturing industries in Penang. This research will be crucial to the E&E MNC manufacturing industries in order to improve organizational performance through the use of supply chain digitalization.

## 1. Introduction

Malaysia serves as a hub for the semiconductor industry in Asia. As it provide the nation's prime geographical positioning and extensive infrastructure, encompassing ports, airports, logistics, and telecommunications, bestow a distinct competitive edge in terms of cost-effective business operations. The Electronics and Electrical (E&E) industry keeps on contributing substantially to Malaysia's Gross Domestic Product (GDP) growth, investments, revenue from exports, and employment, as well as to the country's industrial development (MIDA, 2022). Given the remarkable accomplishments of Malaysia's Electrical and Electronics (E&E) industry, researchers are intrigued by investigating the correlation between the adoption of supply chain digitalization and organizational performance. The digitalization of supply chains holds pivotal importance for organizations navigating dynamic environments. It enables swift responses to short-term industry and market shifts, enhancing operational efficiency, visibility, collaboration, and decision-making capabilities.

## 1.1 Research Background

In the new global economy era, organizational performance in the manufacturing industry has become at the forefront of business concerns. In Malaysia, the E&E industry is concentrated on expanding and enhancing the ecosystems of solar, semiconductors, and light emitting diodes (LED) technologies. Consumer electronics, electronic components, industrial electronics, and electrical equipment are the four sub-sectors that make up the E&E industry in Malaysia. According to MIDA, (2022), electronic components were the largest of these four sub-sectors, accounting for RM92.9 billion same as 62% of all E&E sector investments approved for 2021. It is anticipated that the approved investments will generate a total of 28,362 jobs for Malaysians in the industry.

Supply Chain Digitalization (SCD) has been characterized as an intelligent, customer-focused, system-integrated, internationally-linked, and data-powered approach that utilizes cutting-edge technologies to provide increasingly accessible and cost-effective products and high-value services (Buyukozkan and Gocer, 2018). Supply Chain Digitalization is in its early stages, and the majority of its value-creation potential remains unfilled. However, it has ushered in a period of accelerated change and innovative innovation within supply chains and the other industry (Buyukozkan and Gocer, 2018). It will have a significant impact on the manufacturing industry organizational performance (Lee *et al.*, 2021). Adapted from digital transformation, the 4th industrial revolution will enable businesses to produce more value by developing more flexible and agile supply chain management strategies (Buyukozkan and Gocer, 2018).

## 1.2 Problem Statement

The primary concern lies in the prevalent low organizational performance observed across numerous manufacturing companies in Malaysia. Organizational performance serves as a critical metric, reflecting an organization's operational efficiency and often serving as a pivotal yardstick to gauge a company's success or its prospects for continued existence (Chan *et al.*, 2017). Based on the report by MIDA, (2022), the E&E manufacturing industry encounters significant obstacles primarily due to low organizational performance, leading to shortages aggravated by surging demand for consumer electronics. This shortage is amplified by the underutilization of supply chain digitalization, resulting in challenges faced by chipmakers, such as mounting inventories amidst declining demand. Nevertheless, trade tensions between the U.S. and China, as well as the U.S.'s latest effort to restrict its geopolitical rivals through export bans, have stoked some apprehensions and could impede the operations of some global semiconductor manufacturers and disrupt global supply chains. Therefore, the Malaysia government is focused on speeding the adoption and integration of advanced levels of Supply Chain Digitalization in order to increase adaptability and maximise productivity and growth (MIDA, 2022).

The second issue concerns the lack of awareness regarding Supply Chain Digitalization within the E&E manufacturing industry. Based on studies by Lee *et al.* (2022), reported that the manufacturing companies in Malaysia lack a clear understanding of how Supply Chain digitalization impacts their organizational performance. The majority of these businesses lack understanding, particularly regarding the advantages of implementing Supply Chain Digitalization for company operations. This is supported by SupplyChainDigest, (2016), who reported that the 73% of companies still not aware that SCD could improve their business performance. While the field of Supply Chain Digitalization is still in its inception, there has been a growing interest in how technologies and IT-enabled advancements can be utilized in supply chain on its path to becoming fully digitalized (Buyukozkan and Gocer, 2018).

The third issue revolves around the scarcity of studies examining the relationship between Supply Chain Digitalization and organizational performance. Existing literature reveals a paucity of studies dedicated to exploring the role of digitalization in supply chain management, indicating the necessity for additional research to delve into the impact of digitalization on this domain (Abdirad & Krishnan, 2020). The majority of previous studies have primarily concentrated on examining the relationship between Industry 4.0 and organizational performance. According to Queiroz Maciel *et al.* (2019), several researchers and practitioners have identified Industry 4.0 as one of the most emerging topics, given that traditional business models founded mainly on physical activities have been changed and digital in recent years. The fourth industrial revolution is driving the development of ecosystems with complete connectivity. Organizations are currently reshaping their strategies, including their supply chain management, to become entirely transparent. Web-enabling supply chain activities reduces information sharing barriers. The online channels for procurement, manufacturing, distribution, and sales are anticipated to have a significant impact on organizational performance (Chinelo, 2021). To remain effective in a competitive market, Malaysian manufacturing companies might choose to implement Supply Chain Digitalization in their business processes, as it provides excellent supply chain performance and optimal organizational performance (Lee *et al.*, 2021).

Based on the issues and gaps discussed in this sub-topic, there is a room to improve and to fill the gaps. Hence, this study aims to investigate the relationship between supply chain digitalization and organizational performance within the E&E MNC manufacturing industry in Penang. Through this research endeavor, a

comprehensive understanding of how supply chain digitalization influences organizational performance will be sought, potentially paving the way for enhancements and advancements within the industry.

Therefore, to achieve the research objectives the level of organizational performance and of supply chain digitalization among the Electronics and Electrical Multinational Corporation manufacturing industries in Penang are determined. Consequently, the relationship between supply chain digitalization and organizational performance among the Electronics and Electrical Multinational Corporation manufacturing industries in Penang is identified.

### 1.3 Research Scope

This research limited focuses on supply chain digitalization and organizational performance in the E&E MNC manufacturing industries in Penang. Penang is known as the Silicon Valley of the East due to its vibrant Electronics and Electrical industries. It is a crucial sector for Malaysia's economy, contributing significantly to the country's GDP. Based on Malaysia Investment Development Authority (MIDA, 2022) stated Penang recorded the highest E&E exports at RM32.7 billion in June 2022. The E&E industries is one of the most innovative and technologically advanced sectors, with constant research and development driving growth and progress. The unit of analysis is organizational which focuses on E&E MNC manufacturing industries in Penang. Questionnaires are used to capture the data on the supply chain digitalization and organizational performance among E&E MNC manufacturing industries in Penang. The questionnaire was disseminated online and encompassed inquiries about respondent's demographics. This study utilized a five-point Likert scale, prompting participants to indicate their level of agreement or disagreement with each survey item.

### 1.4 Significance of Study

This study has the potential to advance future research within this field by uncovering the ways in which digital technologies can augment the operational efficiency of E&E industries. Moreover, it can contribute to a deeper understanding of how these technologies facilitate collaboration and communication across the supply chain, fostering innovation and improved performance. The insights from this research could guide future studies on the implementation of such technologies in supply chain management, shedding light on their utilization for enhancing organizational performance.

## 2. Literature Review

This section described the prior research concepts that supported this study in terms of supply chain digitalization and organizational performance. The statement made in the previous study on the measurement or the findings of the previous survey in terms of supply chain digitalization that establish the correlation between supply chain digitalization and organizational performance in the industries.

### 2.1 Electronics and Electrical Manufacturing industry

The electrical and electronics (E&E) sector has been a driving force behind Malaysia's economic growth, contributing substantially to investments, exports, and job creation. Notably, it remains a crucial driver of the nation's industrial progress. Malaysia holds a significant position in the global semiconductor industry, accounting for 7% of global semiconductor trade and holding a 13% market share in chip testing and packaging. Currently, the E&E industry stands as a pivotal pillar of Malaysia's economy, being the country's primary export sector. In 2022, it accounted for a noteworthy 38% of total exports, amounting to RM593 billion. In addition to its economic contributions, E&E products significantly bolster Malaysia's external trade surplus, constituting a remarkable 78% of the country's RM255 billion trade surplus. Notably, the E&E industry in Malaysia encompasses four primary sub-sectors: consumer electronics, electronic components, industrial electronics, and electrical equipment. As we step into 2023, the evolving macroeconomic landscape coupled with challenges in the semiconductor market is fostering a transition within E&E corporations. Many of these companies are now directing their focus towards digitalization, embracing Industry 4.0 initiatives, and enhancing their supply chain management practices. (MIDA, 2022).

In the era of digital transformation, the utilization of digital services for supply chains, supported by analytical algorithms, has become a crucial factor driving competitiveness. The Covid-19 pandemic led to municipal closures, logistical disruptions, and a shift to telecommuting, compelling companies to swiftly restructure their supply chains and expedite digitalization efforts. For the E&E manufacturing industry, embracing the initiative to integrate digital platform technologies and develop digital operational solutions can significantly enhance organizational performance, especially in the face of evolving challenges (Buyukozkan and Gocer, 2018).

## 2.2 Definition of organizational performance

The performance of an organization serves as a crucial determinant of its effectiveness, often indicating its success or likelihood of survival. Corporate governance plays a pivotal role in influencing organizational performance. A well-established corporate governance system can attract investments, optimize capital turnover, and fortify the foundational pillars of the company. This, in turn, is expected to lead to improvements in organizational performance (Chan *et al.*, 2017). By making organizational performance more intelligent through the use of digital technologies and more and better information, organizations can increase their manufacturing output and quality and reduce the number of malfunctions (Bjorkdahl, 2020).

In the contemporary globalized landscape marked by rapid technological advancements, the exchange between economic and social actors has become imperative to capitalize on market opportunities and optimize resource utilization. In such a scenario, businesses face challenges in adding value to their products and services if they cannot swiftly adapt to the pace of information exchange and process management. To enhance organizational performance within a dynamic and competitive environment, logistics companies, exemplified by Alibaba, are increasingly leveraging Information and Communication Technology (ICT) within the evolving supply chain landscape (Chinelo, 2021).

### 2.2.1 Dimension of the organizational performance

Regarding organizational performance, various studies have employed numerous measurements, which can be categorized primarily as financial performance measures and non-financial measures (Lee *et al.*, 2021). However, this study primarily concentrates on assessing financial performance and its association with Supply Chain Digitalization within the E&E MNC manufacturing sector situated in the Pulau Penang area. Financial organizational performance involves evaluating an organization's fiscal health, which represents the financial outcomes resulting from managerial decisions and their execution by the organization's members. Consequently, this study underscores the importance of integrating financial organizational performance within its scope. The subsequent subsection will delve deeper into the discussion on financial performance.

#### a) Financial performance

The Supply Chain Digitalization based solutions enables companies to achieve more cost-effective operations through effective resource allocation and transparent and accurate information that circulates within and outside the company's networks (Baird & Raghu, 2015). Financial performance refers to the assessment of alterations in an organization's financial status. It encompasses the financial consequences resulting from managerial decisions and their execution by the organization's members. Metrics used to evaluate financial performance often include lagging standard financial indicators such as enhanced productivity, return on investment (ROI), and sales of existing products (Al Kurdi *et al.*, 2020).

#### b) Non Financial performance

While Non-financial organizational performance involves assessing an organization's success, effectiveness, or impact using criteria and indicators that extend beyond purely financial aspects. This approach encompasses evaluating performance based on criteria that are not solely tied to economic measures. Non-financial performance indicators or criteria may include various aspects, such as: Environmental Sustainability, Social Responsibility, Customer Satisfaction. (Al Kurdi *et al.*, 2020). In this research, financial performance will serve as the measurement for the dependent variable, which is organizational performance.

## 2.3 Definition of supply chain digitalization

Digitalization refers the process of transforming analogue signals into digital formats, along with the implications of adopting and utilizing these technologies. In the context of supply chain management, digitalizing the supply chain empowers businesses to leverage digital technology extensively for planning, executing transactions, communications, and various operational activities (Sanders & Swink, 2020). Almost 90 percent of companies believe that digitalization will provide a competitive advantage to the supply chain within the next five years (SupplyChainDigest, 2016). Digitalization has begun to garner significant interest from organizations around the globe due to the numerous advantages it offers to all types of businesses (Legner *et al.*, 2017). When these digital and technological companies are not yet ready to use them as well, they are likely to fall behind and eventually lose their market identity (Min *et al.*, 2019).

With Supply Chain Digitalization, organizations can coordinate both physical and financial transfers across the supply chain by exploiting the relational capital that comes with supply chain partnerships (Guggenberger, P., 2020). Online procurement enables businesses to reduce processing expenses and supply chain delays. Thus, the digitalization of essential supply chain activities can help businesses reduce delays and costs, improve information sharing, and facilitate cross-time and space resource coordination (Buyukozkan and Gocer, 2018). Digitalization

has the ability to generate high profits when digitalization tools are effectively implemented and has a significant impact on organization performance through increased efficiency and profitability (Chinelo, U. U., 2021).

## 2.4 Past studies on the relationship between supply chain digitalization and organizational performance

Research on Supply Chain Digitalization (SCD) has been carried out in diverse settings, encompassing manufacturing, services, and other industries. According to previous studies conducted by Lee *et al.*, (2021), a positive correlation has been demonstrated between supply chain digitalization and organizational performance within the Malaysian manufacturing sector. Researchers can conclude that most Malaysian manufacturing industries now recognize the benefits of implementing digital elements within their supply chains.

The study by Rachinger *et al.*, (2018) claimed that implementing digitalization in the supply chain not only improves supply chain performance and organizational performance but also contributes to the growth and overall performance of the organization. In addition, in order to reduce excessive expenses, the implementation of SCD can aid businesses in achieving healthy growth, enhanced service levels across the entire supply chain, competitive value in the market, and staying at the vanguard of changes in the industry. The evaluation of the structural model also demonstrates that Supply Chain Digitalizaion can enhance organizational performance (Lee *et al.*, 2021). The findings indicate that digitalization has contributed to the growth of the manufacturing industry (Ha, 2022).

Prior research indicates that Supply Chain Digitalization significantly elevates organizational performance levels. By enhancing supply chain visibility, connectivity, innovation, real-time responsiveness, transparency, and speed, Supply Chain Digitalization empowers nodal companies to efficiently plan resources and develop capabilities, catering to the diverse needs of consumers (Frank *et al.*, 2019). In addition to increasing organizational efficacy, digital transformation can contribute to the expansion of a business by enhancing consumer value. Digital systems and processes facilitate the consumer voyage by providing expedient transactions and services that can meet the rising demand for personalized products (Gorbach, 2017). In the existing literature, it is widely believed that supply chain digitalization improves organizations performance. Being prepared to confront the new challenges posed by swiftly advancing technologies is a crucial aspect of maintaining the organization's forward momentum and acquiring a competitive edge. However, academic research on how and why digitalization can improve organizational performance within the context of the supply chain is limited.

## 2.5 Research Framework

Based on discussions and findings from previous empirical studies, it has been established that there exists a significant relationship between supply chain digitalization and organizational performance. This insight contributes to the conceptual framework illustrated in Fig. 1. The conceptual framework aims to highlight the relationship between the independent variable and the dependent variable. This study focuses specifically on subjects within the E&E MNC manufacturing industry in Penang. Past studies widely support the belief that there exists a positive relationship between supply chain digitalization and organizational performance.



**Fig. 1** Conceptual framework

## 3. Research Methodology

This section aims at studying the relationship between the supply chain digitalization and organizational performance among E&E MNC manufacturing industries. In this methodology chapter, the procedure for measuring the phenomenon of this study is described. The discussion of subtopics in this chapter includes research flowchart, research design, population and sample, research instrument, pilot study, reliability analysis, data collection, and data analysis.

### 3.1 Research Design

A research design encompasses the techniques and methods employed to gather necessary information and resolve the research problem. The chosen methodology is crucial in obtaining valid and reliable results, aligning with the research objectives and addressing the research questions. In this study, quantitative data were collected using a descriptive design and quantitative methodology. The questionnaire was distributed via online email to the E&E MNC manufacturing industry in Penang. Furthermore, the acquired data will be analyzed using SPSS to derive meaningful insights from the results.

### 3.2 Population and Sampling

The population constitutes the entire set or cluster of units to which the analysis results will be applied. Sampling is the process closely tied to determining the appropriate number of individuals from this population to serve as respondents or deciding on the sample size for the target population.

#### 3.2.1 Population

Based on information by registered website of InvestPenang, (2022), there are 99 E&E MNC manufacturing industries in Penang. The target population consisted executive level such as professional, top-level managers, middle-level managers, lower-level managers in the E&E MNC manufacturing industries. These respondents possess extensive experience in the industry and a comprehensive understanding of Supply Chain Dynamics (SCD) due to their daily involvement in this field. The researcher will select a Penang-based Electronics and Electrical (E&E) multinational corporation (MNC) for this study. Data will be gathered from respondents employing the purposive sampling technique.

#### 3.2.2 Sampling Method

According to Krejcie and Morgan, (1970), list the sample size that matches the size of the population in their study sample size determination table. Below is a table for calculating the sample size of Krejcie and Morgan's (1970) study. According to the table provided by Krejcie and Morgan, (1970), a sample size of 80 respondents would be required for this study. Though the sample size was only 80, the researcher decided to distribute as many as 99 respondents to increase the response rate.

#### 3.2.3 Sampling technique

The researcher employed a purposive sampling method to select respondents for the study, aiming to ensure adequate representation of all participants. This technique involves selecting willing participants who possess the specific information or characteristics required for the research. Purposive sampling facilitates the collection of highly relevant and specific data, thereby yielding deeper insights. By targeting individuals based on their knowledge, this method enables a more comprehensive investigation and understanding of the research phenomenon.

### 3.3 Research Instrument

For the instrument of this research, the survey is employed in this study for collecting the data, includes Section A, B and C. The next sub-section will explain more details on the survey instrument.

#### 3.3.1 Questionnaire Instrument Design

The survey questionnaire method used to collect quantitative data for this study. The questionnaire method allows us to collect information and samples from a large population of respondents more quickly, clearly, and efficiently. This survey design is shown in Table 1 is divided into three sections and includes 12 items. Section A pertains to demographic information concerning respondents, encompassing categories such as gender, age, position, firm age, education level and years of working. While, Section B contains 7 items to measure Supply Chain Digitalization. Section C includes 5 items to measure Organizational Performance. Based on Table 3.2: Questionnaire design, all the measurement items in this study was adopted from several empirical studies. The independent variable that has the 7 items to measure supply chain digitalization adopted by Xue, 2014; Xue *et al.*, (2013). While the dependent variable has the 5 items to measure organizational performance adopted by De Vass, Shee, & Miah (2018).

**Table 1** Questionnaire design

Section	Question	Type of scale	Author			
Section A	Demographics	Nominal scale	(FOK-YEW, O., & HAMID, N. A. A. 2021)			
	Gender					
	Age					
	Education level					
	Position					
	Firms age					
Section B	Years of working	5 Point Likert scale	(Xue, 2014; Xue <i>et al.</i> , 2013)			
	Number of employee					
	Supply chain digitalization (IV)					
	Section C			Organizational performance (DV)	5 Point Likert scale	(De Vass, Shee, & Miah, 2018)

### 3.4 Data Collection

In this research, data is collected using both primary data, and secondary data. By incorporating both primary and secondary data, researchers aim to enhance the comprehensiveness and depth of their findings, enabling a more thorough exploration of the research questions and objectives. The survey encompasses crucial elements such as participant demographics, inquiries pertinent to the study's objectives, and clear instructions, all articulated in easily understandable language.

### 3.5 Data Analysis

The data analysis methods employed in this study encompass a reliability test, pilot test, descriptive analysis, normality test, and Spearman's Correlation test. For this research, the researcher employed SPSS (Statistical Package for Social Sciences) version 27.0 for data analysis. This software streamlines the precise and effective computation of quantitative data. Its utilization simplifies the processes of data collection and analysis compared to conventional methods of data analysis. The Statistical Package for the Social Sciences (SPSS) analysis application was used to analysis the survey's results. For research objectives 1 and 2, descriptive analysis was be employed to examine and analyze the demographic profile of the respondents. This analysis aims to fulfill the first and second research objectives. Conversely, research objective 3 was involve correlation analysis to achieve its specified goal.

## 4. Data Analysis and Results

The results of the questionnaire and the data analysis are presented in this chapter. The target respondents' responses to the questionnaire served as the basis for the study. The response rate was the first to be analyzed, then the respondent's demographics, and the scaling of the variable measurements (reliability and normality tests). The purpose of the data analysis is to answer the research questions and research objectives.

### 4.1 Response Rate

The target population of this survey is all MNC E&E manufacturing companies located in Penang. Based on the list of companies provided by InvestPenang, a total of 99 companies were identified. The questionnaires were distributed to these 99 companies. Subsequently, 60 questionnaires were answered, resulting in an approximate response rate of 60.6%. Table 2 shows the response rate obtained in this research.

**Table 2** Response rate

No of questionnaires had been distributed	No of questionnaires returned back	Returned response rate
99	60	60.6%

### 4.2 Summary of Demographic

Demographic analysis involves evaluating personal information obtained from the received questionnaires to determine the frequency and percentage of each recorded response. In this research, 60 questionnaires were

distributed to individuals holding positions as professionals, top-level managers, middle-level managers, and lower-level managers within the E&E MNC manufacturing industries.

The findings are detailed in Table 3 show that the male percentage is 54.7%, with 31 respondents and 48.3% female, including 29 respondents. From the research, the total number of respondents in the 30-39 age group is the highest recorded, with 47 respondents representing 78.3%. The percentage of respondents in the age group 20 - 29 years old was the lowest recorded in the study which is 6.7% with only 4 respondents. Regarding education levels among the 60 respondents, the majority accounting for 86.67%, possessed a degree, totaling 52 respondents. The lowest recorded is one individual held a diploma, constituting 1.67%.

Furthermore, among the subcategories of the E&E manufacturing companies, the highest number of respondents was in Electronic Components, totaling 22 units, representing 36.7% of the distribution. While, the lowest number of respondents was in Consumer Electronics, amounting to 7 units, which accounts for 11.7% of the total. The highest number of working years reported by respondents within between 5-10 years, with 48 respondents, constituting 80%. Conversely, the lowest reported working years among respondents between 11-15 years, with 5 respondents, accounting for 8.3%. The highest position held among respondents is Middle-level managers, comprising 33 respondents, which accounts for 55%. Conversely, the lowest position held is Professional, represented by 1 respondent, making up 1.67%.

**Table 3** Summary of demographic analysis

Demographic	Classification	Frequency (N)	Percentage (%)
Gender	Male	31	54.7
	Female	29	48.3
Age	20-29 years old	4	6.7
	30-39 years old	47	78.3
	40-49 years old	9	15.0
Education level	Diploma	1	1.67
	Degree	52	86.67
	Master Degree	5	8.33
Sub category of the E&E manufacturing company	PhD Degree	2	3.33
	Electronic Components	22	36.7
	Consumer Electronics	7	11.7
	Industrial Electronics	10	16.7
	Electrical Products	21	35.0
Working years	Less than 5 year	7	11.7
	Between 5-10 years	48	80
	Between 11-15 years	5	8.3
Position held	Low-level manager	8	13.33
	Middle-level manager	33	55
	Top-level manager	18	30
	Professional	1	1.67

### 4.3 Reliability and Validity Analysis

In this research, reliability and validity analysis are used to test the internal consistency and accuracy of items in the questionnaire. Furthermore, the reliability and internal consistency of the set of survey items were assessed using Cronbach's alpha. Therefore, both the pilot study and the actual study was tested in this study.

#### 4.3.1 Reliability and Validity of Pilot Test

A pilot test was conducted in this study to ensure that the questionnaire was reliable and valid before the actual study was conducted. In this pilot test, 15 respondents participated in the pilot test. A total of 12 items were measured, with 7 items for the independent variables (supply chain digitalization) and with 5 items for the dependent variables (organizational performance). Table 4 showed that the value of Cronbach's Alpha ( $\alpha$ ) for the pilot test of 15 respondents, the items for SCD showed alpha value is 0.957, it shows that the items to measure SCD is excellent reliability. Furthermore for dependent variable, 5 items for used to measure the organizational performance. Based on the result the Alpha value is 0.803, it shows that the items to measure organizational is good reliability. Based on the results, the Cronbach's Alpha ( $\alpha$ ) value is excellent reliability for independent variable, and for dependent variable is good reliability and the questionnaire can be used for the actual study.



**Table 4** Reliability test for pilot test

N of Items	Variables	Cronbach's Alpha ( $\alpha$ )	Interpretation
7	Supply Chain Digitalization	0.957	Excellent
5	Organizational Performance	0.803	Good

### 4.3.2 Reliability and Validity of Actual Study

After conducting the pilot test, the questionnaire intended for the actual study underwent a reliability test. A total of 60 respondents, comprising managers or professionals within the E&E MNC manufacturing industries, participated in the actual study. The results from Table 5 reveal an excellent Cronbach's Alpha ( $\alpha$ ) value of 0.947 for supply chain digitalization and an acceptable reliability score of 0.791 for organizational performance. These findings signify the questionnaire's commendable reliability in this study, suggesting its suitability for adoption.

**Table 5** Reliability test for actual test

N of Items	Variables	Cronbach's Alpha ( $\alpha$ )	Interpretation
7	Supply Chain Digitalization	0.947	Excellent
5	Organizational Performance	0.791	Acceptable

## 4.4 Descriptive Analysis

In this section, descriptive analysis is employed to fulfill the first and second research objectives, which involve identifying the levels of organizational performance and supply chain digitalization. Therefore, the researcher will use the data obtained from this study to describe the mean and central tendency of the variables under study, while using the mean as a measure.

### 4.4.1 Descriptive analysis of organizational performance

This section to examine the level of organizational performance among the Electronics and Electrical Multinational Corporation manufacturing industries in Penang. Based on 5 point likert scale used to measure all the items. In this study were the criteria range from 1 (Strongly disagree) to 5 (strongly agree), the minimum to maximum value should range from 1-5. Table 6 shows the recorded mean and standard deviation of organizational performance. Overall, all the items indicate high mean score according to the central tendency level. The standard deviation ranges from 0.767 to 0.811 across the variables. The highest mean score among the five items related to organizational performance is 4.32, accompanied by a standard deviation value of 0.770, which corresponds to the item "Our company always reduces the cash-to-cash cycle time." The overall mean score for organizational performance was recorded at 4.14, signifying a consistently high level, as supported by the standard deviation. These findings indicate that the level of organizational performance within the E&E MNC manufacturing industries in Penang falls within the 'high level' category.

**Table 6** Descriptive analysis of organizational performance

Statement	Mean	Std.Deviation	Level
Our company always improve its productivity (e.g. assets, operating costs, labour costs).	4.23	0.767	High
Our company always improve the sales of existing products.	4.12	0.783	High
Our company always improve its financial ratios such as return on assets, return on investment and return on equity.	3.98	0.792	High
Our company always perform a cost-saving during the production process in raw material, energy, water, human, machine and equipment.	4.05	0.811	High
Our company always reduce the cash-to-cash cycle time.	4.32	0.770	High
Average mean	4.14	0.579	High

### 4.4.2 Descriptive Analysis of supply chain digitalization

This section to examine the level of supply chain digitalization among the Electronics and Electrical Multinational Corporation manufacturing industries in Penang. Based on 5 point likert scale used to measure all the items. In this study were the criteria range from 1 (Strongly disagree) to 5 (strongly agree), the minimum to maximum value should range from 1-5. Based on the Table 7, each of the items was indicate with moderate and high mean score and the standard deviation is in range 0.871 to 1.132. Meanwhile, the highest mean score among the 7 items in supply chain digitalization is 3.92 with standard deviation value 0.889 whereby the question is “Our company always applies digital technologies within the company.” The overall mean score in supply chain digitaliaztion was recorded 3.64 where it remained at moderate level with a standard deviation of 0.97. These findings indicate that the level of supply chain digitalization within the E&E MNC manufacturing industries in Penang falls within the 'moderate level' category.

**Table 7** Descriptive analysis of supply chain digitalization

Statement	Mean	Std.Deviation	Level
Our company always applies digital technologies within the company.	3.92	0.889	High
Our company transacts with a high proportion of suppliers through digital technologies.	3.77	0.890	High
Our company conducts high transactional volume with suppliers through digital technologies.	3.77	0.871	High
Our company always applies digital technologies to transact with suppliers.	3.80	0.971	High
Our company transacts with a high proportion of customers through digital technologies.	3.52	1.000	Moderate
Our company conducts high transactional volume with customers through digital technologies.	3.33	1.020	Moderate
Our company always applies digital technologies to transact with customers.	3.35	1.132	Moderate
Average mean	3.64	0.85	Moderate

### 4.5 Normality Test

In this study, the Kolmogorov-Smirnov test was utilized instead of the Shapiro-Wilk test. The choice was made due to the sample size exceeding 50, with a total dataset of 60. If the p-value > 0.05, the data is normally distributed, if the p-value < 0.05, the data is non normally distributed. Referring to Table 8, it shown the data is not normal, Spearman’ Correlation will conduct in this research.

**Table 8** Result of normality test

Variable	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk			Result
	Statistic	df	Sig.	Statistic	df	Sig.	
Supply Chain Digitalization	.150	60	.002	.907	60	.000	Non-normal
Organizational performance	.157	60	.001	.927	60	.001	Non-normal

a. Lilliefors Significance Correction

### 4.6 Correlation Analysis

Base on Table 9, Correlation analysis using Spearman’ Correlation test, it shows that the correlation is significant. The value of Spearman’s rho correlation is 0.741. The correlation coefficient shows that there is strong significant relationship between Supply Chain Digitalization and Organizational performance in E&E MNC manufacturing industries in Penang.

**Table 9** Correlation analysis using Spearman' correlation test

			Supply Chain Digitalization	Organizational performance
	Supply Chain Digitalization	Correlation Coefficient	1.000	.741**
		Sig. (2-tailed)	.	.000
		N	60	60
Spearman's rho	Organizational performance	Correlation Coefficient	.741**	1.000
		Sig. (2-tailed)	.000	.
		N	60	60

\*\* Correlation is significant at the 0.01 level (2-tailed).

## 5. Discussion and Conclusion

### 5.1 Discussion on Research Objective

The first research objective of this study is to identify the level of organizational performance among the Electronics and Electrical Multinational Corporation manufacturing industries in Penang. The second objective is to examine the level of supply chain digitalization among the Electronics and Electrical Multinational Corporation manufacturing industries in Penang. The third research objective is to investigate the relationship between the supply chains digitalization and the organizational performance. This study comprised 99 employees who held various positions within the E&E MNC manufacturing company Penang, including professional, top-level managers, middle-level managers, and lower-level managers. Nevertheless, a mere 60 surveys were effectively collected via the email. The result therefore shows the response to the objective in accordance with the result that was analysed. Descriptive analysis was employed to assess the first and second objectives, while a Spearman correlation analysis was conducted to address the third objective.

#### 5.1.1 Level of organizational performance among the Electronics and Electrical Multinational Corporation manufacturing industries in Penang.

Based on the descriptive analysis, the overall mean level of organizational performance is 4.14, categorizing it as a high-level organizational performance. The results show most respondents agreed with the statement that "our company always reduces the cash-to-cash cycle time" was influence the level of organizational performance. This finding is consistent with previous studies that were carried out by Lee *et al.*, (2021), stated the cash-to-cash cycle time that is shortened results in a reduction of capital invested in accounts receivable, production, and inventory, it was improve the level of organizational performance, and encouraging healthy business development. This results in the liberation of money, which improves funding and allocates additional resources towards critical business activities such as debt reduction, expansion, or innovation. The finding matches previous research carried out by Abu-Jarad *et al.*, (2010), despite the fact that organizational performance has come to be as the main focus for all types of organizations, the conceptualization of performance measurement remains challenging. Hence, value creation constitutes the essence of organizational performance. By making organizational performance more intelligent through the use of digital technologies and more and better information, organizations can increase their manufacturing output and quality and reduce the number of malfunctions (Bjorkdahl, 2020). As long as the value produced by the contributed assets meets or exceeds the anticipated value, the organization will retain the assets. The organization is essential for its continued existence and survival in the market. Therefore, value creation assumes a pivotal position as an essential component within the comprehensive performance criteria of any given organization (Lee *et al.*, 2021).

#### 5.1.2 Level of supply chain digitalization among the Electronics and Electrical Multinational Corporation manufacturing industries in Penang.

Based on the descriptive analysis, the overall mean for supply chain digitalization is 3.64, indicating a moderate level of supply chain digitalization. The results show the results show most respondents agreed with the statement "our company always applies digital technologies within the company" was influence the level of supply chain digitalization. This finding is consistent with previous studies that were carried out by Legner *et al.*, (2017), global organizations have begun to pay considerable attention to digitization due to the fact that it provides numerous businesses with superior advantages. Supply chain Digitalization allows the planning and

execution of transactions, communications, and actions with the greatest possible utilization of digital technologies (Sanders & Swink, 2020). The mentioned implementations of digital technologies improve the velocity, effectiveness, and robustness of the supply chain. According to Liu and Chiu, (2021), the digitalization of the supply chain is indicative of the organization's proactive stance on digital transformation. Supply Chain Digitalization can improve supply chain visibility, connectivity, innovation, real-time, transparency, and speed, allowing nodal companies to better plan resources and develop capabilities to meet the diverse requirements of consumers (Frank *et al.*, 2019). The level to which an organization directly accepts digital technologies frequently signifies its general preparedness and proclivity for digital transformation in its supply chain operations. Organizations that successfully use digital technologies often attain a competitive advantage. Implementing digital supply chain processes may offer several benefits, including improved inventory management, decreased lead times, and cost savings, all of which contribute to a more robust market position. The findings indicate that digitalization has contributed to the growth of the manufacturing industry (Ha, L.T., 2022).

### **5.1.3 Relationship between supply chain digitalization and organizational performance among the Electronics and Electrical Multinational Corporation manufacturing industries in Penang.**

Correlation analysis was used to investigate the relationship between supply chain digitalization and organizational performance among the Electronics and Electrical Multinational Corporation manufacturing industries in Penang. Based on the findings it show that they are a strong relationship between Supply Chain Digitalization and Organizational performance in the E&E MNC manufacturing industries in Penang. It was found that the value of spearman correlation of two variables were 0.741 at significant level  $p < 0.05$  as shown in correlation in the previous chapter. This presented the relationship between two variables were strong positive correlation.

This research matches the findings of previous research conducted by Rachinger *et al.*, (2018), which similarly observed that the adoption of supply chain digitalization not only improves organizational performance but also contributes to the overall growth and success of the organization. SCD implementation can help businesses in achieving competitive market values, improving organizational performance, maintain a competitive edge in ever-evolving industries, and reducing superfluous expenditures, among other benefits. Digitalization has the ability to generate high profits when digitalization tools are effectively implemented and has a significant impact on organization performance through increased efficiency and profitability (Chinelo, U. U., 2021). By making organizational performance more intelligent through the use of digital technologies and more and better information, organizations can increase their manufacturing output and quality and reduce the number of malfunctions (Bjorkdahl, 2020). In light of the need for competitive advantage and global competition, a number of manufacturing companies are implementing the most advanced technological solutions to improve organizational performance (Chinelo, U. U., 2021).

In summary, Malaysian manufacturing firms could potentially consider implementing the SCD into their organizational performance processes as a means to maintain dependability in a highly competitive market through the provision of optimal organizational. Preparation to confront novel challenges arising from an ever-evolving global landscape and swift technological advancements is the fundamental factor that propels an organisation forward and secures competitive advantages.

## **5.2 Implication of the Research**

The implication of this research shows contributes to the body of knowledge regarding the effects of SCD on organizational performance. Additionally, the manufacturing company may utilize this study as a point of reference when making determinations regarding the adoption of SCD. Further, this research helps organizations, particularly management in comprehending the benefits and repercussions of SCD implementation on organization performance. In addition, it will provide the manufacturing company with improved visibility and comprehension, which may influence their views on its adoption. Each organization's manager must ensure that the supply chain has a comprehensive comprehension of the digitalization policy and values enhanced digital capabilities to improve the company's performance in order to remain dynamic and important in the digital megatrend (Al Kurdi *et al.*, 2020).

In summary, this research assists management in gaining an understanding of the benefits and possible obstacles that may arise from the implementation of SCD. Additionally, Organizations that implement digitalization in their supply chains with efficacy may attain a competitive edge. Further, this research could identify critical technological investment opportunities for these multinational corporations to preserve their market leadership. Furthermore, this research could potentially offer manufacturing firms enhanced insight into the ramifications of adopting SCD, thereby empowering them to make well-informed choices. Further research in this area may result in the formulation of creative frameworks, models, or theories that provide a more

comprehensive understanding of the ramifications and complexities of supply chain digitalization in manufacturing supply chains.

### 5.3 Limitation of the Research

The time constraint is the limitation of the research. The data collection period for this research is only about three months. In contrast to previous research, the majority of researchers allocated a time frame of one to four years to complete their research falling within a similar scope as the present study. Due to this situation, the researcher had difficulties getting the minimum sample as suggested by the Krejcie and Morgan, (1970). Besides, the sample size for this study was limited at 80, only 99 questionnaires were distributed to and returned 60 questionnaires by the participants. In fact, it is difficult to find the exact number of Penang E&E MNC Logistics. So, based on some online research I conducted, there are almost a population of 99 E&E MNC manufacturing industries. Research achievements that involve multiple organizations and elaborate supply chain digitalization and organizational performance frequently demand a substantial investment of time to gather, analyze, and interpret data. Time limitations might hinder the comprehensiveness of the research or limit the extent of data gathering.

### 5.4 Recommendation

Based on the result obtained in this study the relationship between supply chain digitalization and organizational performance among E&E MNC manufacturing industry shows a strong relationship the category of strong correlation. Thus from the result obtained, supply chain digitalization able to contribute positive return on organizational performance in E&E industry. As a recommendation, researcher would like to suggest that in order to maximise the use of the time provided. Researchers should fully develop their research schedule in the earliest stages. By focusing efforts on important factors or parts within a limited period of time, one may ensure a comprehensive analysis even in the face of limitations. In addition, taking advantage of previous data sources and industry reports can serve as additional resources to primary data collection during the limited timeline. The inclusion of related data sources improves the depth of the research, overcoming the limitations imposed by the period of data collection.

For this research, the researcher only focused on one state only then the feedback from the respondents would be limited. It is suggested that future research concentrate on Malaysia, doing so would enable the investigator to obtain precise data from participants, as a larger sample size tends to yield more reliable and accurate results. Finally, it is recommended that future studies employ a combination of methods, mixing both quantitative and qualitative methodologies. To gather data and address all research inquiries. The combined methods approach will contribute significant insights that can enhance the researcher's comprehension for subsequent investigations.

### 5.5 Conclusion

In this study successfully identified the level of organizational performance, and supply chain digitalization among the Electronics and Electrical Multinational Corporation manufacturing industry in Penang. Besides, the investigation delved into elucidating the potential relationship between supply chain digitalization and organizational performance. By analyzing the correlation analyses, the research revealed a strong relationship between supply chain digitalization and organizational performance among the E&E MNC manufacturing industry specifically in Penang.

In conclusion, this study underscores the significant impact of supply chain digitalization on organizational performance, thereby contributing valuable insights to the industry. The findings underscore the pivotal role of integrating digital technologies within supply chains to enhance operational efficiency, foster competitiveness, and elevate overall performance within multinational corporations (MNCs) in the electronics and electrical industry based in Penang. These insights serve as a foundation for informed strategic decision-making and pave the way for further research aimed at optimizing digitalization strategies and bolstering organizational outcomes within this sector.

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### Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

## Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** C.H.X. and N.K.K.; **data collection:** C.H.X.; **analysis and interpretation of results:** C.H.X.; **draft manuscript preparation:** C.H.X. and N.K.K. All authors reviewed the results and approved the final version of the manuscript.

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