THE STUDY OF THE INFLUENCE OF TECHNOLOGY READINESS ON SMART SUPPLY CHAIN PERFORMANCE IN MANUFACTURING FIRMS

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APPROVAL

"I hereby declare that I had read and go through for this thesis and it is adequate in term of scope and quality which fulfill the requirements for the awards Bachelor of Technology Management (Technology Innovation) with Honours"

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DECLARATION OF ORIGINAL WORK

I hereby declare that the work in this study is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in the candidature of any other degree.

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DEDICATION

I would like to express my appreciation to my beloved family and friends, who were always encouraging and supportive as I worked on the research. In addition, my supervisor, Pn. Nor Ratna Binti Masrom, and panel, Ts. Dr. Nurulizwa Binti Abdul Rashid, supervised my research, and course mates assisted me in completing the research path.

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ABSTRACT

Smart supply chain nowdays is very important for suppliers, manufacturers, customers and especially to the company. Meanwhile, in Malaysia, smart supply chain is still blurred. Even through this practice can give an impact on firm performance, but many companies still unconscious about this. The aim of this research is to identify the level of technology readiness among manufacturing firms . .After that, these studies also analyze the relationship between technology readiness and smart supply chain performance among manufacturing firms . Before that, the researcher will identify the hishest factor of technology readiness contribute to smart supply chain management performance among manufacturing firms. A survey was carried out through a set of questionnaires to distribute to the respondent. About 120 respondents of manufacturing firms in Malaysia which come from different position in the company and industry had answered the questionnaire. The data were analysed using inferential analysis. From the data analysis and findings, all the elements such as optimism, innovativeness and discomfort will be footef. Hence, this element can give the impact on smart supply chain performance in manufacturing firms. There is theory and practical implication of this study such as introducing a new knowledge and the technology readiness can improve the implementation of this practice. Other than that, the future research can do a research about smart supply chain at a big company or international company.

Keyword: technology readiness, smart supply chain performance , manufacturing firms

ABSTRAK

Rangkaian bekalan pintar pada masa kini sangat penting untuk pembekal, pengilang, pelanggan dan terutamanya kepada syarikat. Sementara itu, di Malaysia, rantaian bekalan pintar masih kabur. Walaupun melalui amalan ini boleh memberi impak kepada prestasi firma, tetapi banyak syarikat masih tidak sedar tentang perkara ini. Matlamat penyelidikan ini adalah untuk mengenal pasti tahap kesediaan teknologi dalam kalangan firma pembuatan. .Selepas itu, kajian ini juga menganalisis hubungan antara kesediaan teknologi dan prestasi rantaian bekalan pintar dalam kalangan firma pembuatan. Sebelum itu, pengkaji akan mengenal pasti faktor hishest kesediaan teknologi menyumbang kepada prestasi pengurusan rantaian bekalan pintar di kalangan firma pembuatan. Tinjauan telah dijalankan melalui satu set soal selidik untuk diedarkan kepada responden. Kira-kira 120 responden firma perkilangan di Malaysia yang berasal dari kedudukan berbeza dalam syarikat dan industri telah menjawab soal selidik tersebut. Data dianalisis menggunakan analisis inferensi. Daripada analisis dan penemuan data, semua elemen seperti optimisme, inovasi dan ketidakselesaan akan menjadi tumpuan. Oleh itu, elemen ini boleh memberi kesan kepada prestasi rantaian bekalan pintar dalam firma pembuatan. Terdapat teori dan implikasi praktikal daripada kajian ini seperti memperkenalkan sesuatu pengetahuan baharu dan kesediaan teknologi dapat menambah baik pelaksanaan amalan ini. Selain daripada itu, kajian masa hadapan boleh membuat kajian tentang rantaian bekalan pintar di syarikat besar atau syarikat antarabangsa.

*Kata kunci: kesediaan teknologi, prestasi rantaian bekalan pintar, firma pembuat*an

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter explains about background of the study, research problem, research question, research objectives, research scope, significance of study, limitation of study and importance of the study. To complete a Bachelor Degree Dissertation (Projek Sarjana Muda PSM) in Faculty of Technology Management and Technopreneurship (Bachelor of Innovation), researcher chooses to investigate the influence of technology readiness on smart supply chain performance in manufacturing firms.

1.2 Background of study

Modern supply chain processes demand cutting-edge technological advancements, best digitization practises, and technical solutions. The actions

included in the supply chain process collectively from many consumers and suppliers connected by cutting-edge technologies are known as the smart supply chain. Data accessibility, relationships, collaboration, and market knowledge are all improved by the smart supply chain.The company can utilise this information to improve the consumer's experience with, ability to produce, and credibility of its products. In order to maximise the benefits for manufacturing companies, organisations across the globe strive to give full attention to the application of digitalization in production and supply chain management. The smart supply chain has given the businesses many advantages, but many of those advantages are still underutilised.There are several reasons why the advantages of digitization are not being fully utilised, including the disruption of the firm's change or managers' irresponsibility. The combination of digital tools and tactics that link the customer to the supplier and the entire workforce to one another is necessary for the smart supply chain to be profitable. The integration of smart technologies and digital transformation are the two key components of the smart supply chain.

They came to the conclusion that technology development is necessary for effective smart supply chain transformation. By utilising digital technologies, digital transformation is the innovation of organisational culture to stimulate uniqueness in corporate operations and production. The company employs digital technologies to innovate business processes in stage one. Specific tasks are carried out in the second stage, such as deciding whether or not shops should move from a physical storefront to an online platform. In the third phase, businesses use digital technologies to alter the value of their products.

Using digital technologies like 3D printing, big data analysis, and the Internet, Hagberg et al. (2016) claim that it is a process where businesses or industries

innovate their production process. By enhancing the relationship between the customer and supplier and fostering internal and external collaboration, the business can accelerate product value and increase its profit margin. The digital transformation is not something that can be accomplished by one person; rather, it requires a programme of collective effort. Therefore, effective smart supply chain management is crucial to enabling businesses to shift their traditional methods of conducting business, restructure task execution, partner and stakeholder interaction, and create a new business model.

1.3 Problem statement

The term ‘smart’ has even been coopted in economics, with smart economy gradually becoming a thing and referring to technologies that support new forms of collaboration and value creation that lead to innovation, competitiveness and entrepreneurship (Haddud & Khare, 2020). Even so the pace of the adoption of technologies readiness has not been as high as expected and furthermore not all of the adoption projects have been successful (Pham et al., 2020). Another theoretical foundation is technology readiness (McNamara et al., 2022; Queiroz et wl., 2019). Technology readiness has been demonstrated by many empirical studies to have impacts on smart supply chain performance (Poushneh & Vasquez-Parraga, 2018). Based on the integration of the chain model, technology readiness, and evidence

from previous empirical studies, the current study examines factors that influence intention to use toward smart supply chain . (Pham et al., 2018). In a business-to-business (B2B) context, the readiness of organisations to engage with new and existing technologies is important especially manufacturing firms who need to exploit the benefits of the Internet as a medium to extend their business activities.

Previous studies have suggested that technology readiness affects manufacturing firm use intention (AlMulhim., 2019). However, very few studies have been conducted in the smart supply chain environment on this factor (Pham et al., 2018). Findings from previous studies identified factors, such as lack of competencies, limited technological resources and the high cost of developing and maintaining websites as inhibitors of manufacturing firms readiness to adopt or advance their online presence (Kim, 2022; Poushneh & Vasquez-Parraga, 2018). From the foregoing, it appears that 'smartness' is not just a thing, but is here to stay. In practice, the term 'smart' has become highly politicized, and is mostly linked to environment friendly or green initiatives and is no longer necessarily about connectedness and interconnections, but more about how green an initiative is.While much attention has been given to the readiness of manufacturing firms to adopt new technologies including such models as the Technology Acceptance Model (TAM) (Mishra, 2018) and the work on diffusion of innovations (Olatunde et al., 2022), less attention has been given to the issue of how ready organisations are to adopt new technologies or to apply already adopted technologies in innovative ways (Jung-Yu and Chorng-Shyong, 2017).

A lone exception was research conducted by Pham et al. (2018), but this research only focused on the simple direct relationship between technology readiness and smart supply chain performance. There are no studies identified that

explore technological readiness and any theoretical underpinnings for smart supply chain. Consequently research focusing on the readiness of manufacturing to adopt new technologies such as the smart supply chain is considerably limited (Jung-Yu and Chorng-Shyong, 2010; Asare et al., 2020). Extant research on the readiness of manufacturing firms to adopt technology is even more limited (Kuan and Chau, 2001). Palmer et al. (2022) takes a different perspective and considers the prediction and assessment of ongoing usage of internet based customer service technology in a set of regional offices in the USA. This research design adopts an manufacturing firms perspective and examines the influence Technology Readiness on smart supply chain performance. In doing so it seeks to build on the multi-dimensional technology readiness construct (Parasuraman, 2019) by exploring its relevance and applicability within a B2B context.

1.4 Research Questions

The following research question is being addressed in this study:

i. What are the level of technology readiness among manufacturing firms?

ii. What is the relationship between technology readiness and smart supply chain performance among manufacturing firms?

iii. What is the highest factor of technology readiness contribute to smart supply chain management performance among manufacturing firms?

1.5 Research Objectives

The research's objective was the study of the influence of technology readiness on use intention toward smart supply chain in manufacturing firms. The following are the research objectives:

i. To identify the level of technology readiness among manufacturing firms.

ii. To analyze the relationship between technology readiness and smart supply chain performance among manufacturing firms.

iii. To find the highest factor of technology readiness contribute to smart supply chain management performance among manufacturing firms.

1.6 Scope of study

The scope of the study is the distribution of questionnaires to analyze the influence of technology readiness on smart supply chain performance in manufacturing firms. Respondents will consist of employees in manufacturing firms who hold positions at the executive level or higher. This study focused on respondents in job positions because they are more responsible in making decisions.

The resource-based view (RBV) theory were be used in this study. The Resource-Based View (RBV) hypothesis has become the dominant paradigm in strategic planning, allowing us to understand how organizations produce efficient decisions, according to the study. Furthermore, it provides us with critical information about the efficiency and management of the industry.

1.7 Limitation of study

In conducting this research, researcher faced with some limitations such as time constraint, lack of skill and knowledge and the cooperation from respondents. The researcher lacks both skill and knowledge because he or she has no prior research experience. Researcher has limit time of research due to the short period given in implementing her study. Researcher has some difficulties to find as much as information and details related to her study in a given timeframe. Because this study solely includes responses from manufacturing firms in Malaysia, the results are more focused on manufacturing firms than on respondents from other industries. One of the constraints was the respondents' honesty when answering the questionnaire about their expertise or understanding of technology readiness and its effect to smart supply chain. Respondents' cooperation includes the obligation to complete the questionnaires. The majority of them do not answer it entirely, and another constraint

expressed by respondents is their honesty. The researcher has no way of knowing whether or not the responses made by respondents are truthful.

1.8 Significant of study

The notion of Resource-Based View (RBV) also serves as a theoretical underpinning. RBV theory is a theory that states that This research adds to the notion of comprehending the technology readiness on use intention toward smart supply chain in manufacturing firms. This study also intends to fill a research gap in prior studies in terms of theoretical merit. Previous studies have failed to emphasise the real-world use of smart supply chain, particularly in the manufacturing industry (Büyüközkan & Göçer, 2018). Future scholars will be able to better grasp the the influence of technology readiness on use intention toward smart supply chain in manufacturing firms as a result of this research. Furthermore, the manufacturing organisation can utilise this study as a guide in the decision-making process to adopt smart supply chain. This research will help manufacturing firms, particularly top management, better understand the effects and benefits of technology readiness adoption on smart supply chain performance and, ultimately, intention to use. Furthermore, it will aid manufacturing companies in gaining a deeper understanding of the technology, as well as bolstering their perspectives on its implementation. Organizations also have a technique for determining the best time to install the smart

supply chain system, which dimension to use, and how to do it properly. To stay relevant and alive in the digitization megatrend, every business management must guarantee that supply chains have a clear understanding of the digitization policy and are focused on improving digitalization skills.

1.9 Chapter Summary

This section summarizes the description of the research analysis. The background of the study was focused on the current situation by a description of technology readiness on use intention toward smart supply chain. A statement problem that has already been discussed in this chapter is also the reason existing for this research. In addition, this chapter also deals with three research questions and objectives. Moreover, this chapter already contains important research by significant study into the factor of technology readiness in the manufacturing firms. Besides, in Chapter Two, the investigative variables were formed by independent variables and dependent variables. Other than that, this research also contains Chapter Three. It was restricted by the time limit, the location, and the honesty of the respondents regarding to this research. All of this will be discussing more on Chapter Three. In addition, the respondent's data will be records one by one in the Chapter Four. The records of the data will be using SPSS version 27.0. Lastly, in Chapter Five, the respondent's data will be concluded by observing the hypothesis of all the independent variable that using in this research. The reason of hypothesis accepts, and reject will be have more discussion on Chapter Five.

CHAPTER 2

LITERATURE RIVIEW

2.1 Introduction

This chapter had examined the problems, issues, ideas, points of view, and other's conducted research results in the field of study. The technology readiness and definition of smart supply chain will be discussed in the literature review. The researcher will determine on how the use of previous research will generate the information and details thus can construct the theoretical framework. This explanation is to give some overview of the basic element.

2.2 Technology Readiness

TR refers to people's propensity to embrace and use new technologies for accomplishing goals in home life and at work (Parasuraman, 2018). TR construct can be viewed as an overall state of mind resulting from a gestalt of mental enablers and inhibitors that collectively determine a person's predisposition to use new technologies. At the measurement level, the Technology Readiness Index (TRI) was developed to measure people's general beliefs about technology. TR construct comprises four sub-dimensions: optimism, innovativeness, discomfort, and insecurity. Optimism relates to a positive view of technology and a belief that technology offers people increased control, flexibility, and efficiency. Innovativeness refers to a tendency to be a technology pioneer and thought leader. Discomfort consists of a perception of lack of control over technology and a feeling of being overwhelmed by it. Insecurity involves distrust of technology and skepticism about its ability to work properly. Optimism and innovativeness are drivers of TR, while discomfort and insecurity are inhibitors.

Positive and negative beliefs about technology may coexist, and people can be arrayed along a technology belief continuum from strongly positive attitude at one end to strongly negative attitude at the other. The correlation between people's TR and their propensity to employ technology is empirically confirmed by Parasuraman (2020). Consumers' TR has a positive impact on their online service quality perceptions and online behaviors, but empirical findings are scarce (Zeithaml, Parasuraman, & Malhotra, 2017) and confounding (Liljander, Gillberg, Gummerus, & van Riel, 2019). Therefore, the role of TR may be minor in explaining

individuals' online behaviors (Liljander et al., 2019). The limited knowledge about TR constitutes a need to investigate TR in a broader framework.

2.2.1 Optimism

Optimism is conceptualized as a driver of technology readiness, and relates to a positive view of technology and a belief that technology offers people increased control, flexibility and efficiency (Lin and Chang, 2015). Optimists have a strong believe that technology is able to make favourable conditions for them to fulfil home and work requirements (Godoe and Johansen, 2017; Vize et al., 2019; Walczuch et al., 2016). Optimism will help people have increased control, trust in technology, perceived ease of use, and perceived usefulness (Acheampong et al., 2017; Johnson et al., 2018; Lu et al., 2022; Wang and Sparks, 2017). Optimistic people believe that technology gives them a lot of value and useful functions to finish their work in companies and their tasks at home in the most effective and efficient way (Parasuraman, 2000; Parasuraman and Colby, 2017). Optimism is positively related to satisfaction (Chen and Chen, 2019; Lin and Hsieh, 2017; Thong et al., 2020). Recent studies investigating individuals' readiness to accept and adopt new technologies, for example self service technologies have found that individuals who have positive perceptions of technology are more likely to accept and adopt new technologies (Liljander et al., 2016; Lin and Hsieh, 2017).

Empirical investigations in online retailing have also found that owner/mangers who have a positive view of the benefits of implementing web technology in their business are more likely to adopt the web as a channel to market (Doherty and Ellis-Chadwick, 2019; Weltevreden and Boschma, 2018). Furthermore those that perceive the web as superseding existing technologies support efficient execution of web strategies which in turn leads to more advanced e-commerce activities thus facilitating a competitive edge in the online marketplace (Doherty et al., 2019)

2.2.2 Innovativeness

Research asserts that innovation is regarded as a key ingredient to gaining a competitive edge and individuals who display innovative characteristics tend to be technology pioneers and early adopters of new technologies (Iacovou et al., 2019; Rogers, 2017). Arguably decision makers of online organizations display innovative characteristics due to their willingness and ability to cope with the complexity and uncertainty of operating in the virtual domain (Rogers, 2020). However, as technology readiness is likely to be greater in those individuals they are also likely to consult expert advice, opinions and services from specialists in order to advance ecommerce opportunities to facilitate a strong competitive position online (Ray and Ray, 2016; Weltevreden and Boschma, 2018).

Innovativeness refers to a person's tendency to become a technological pioneer and thought leader in adoption and acceptance of new technologies (Parasuraman, 2020; Parasuraman and Colby, 2018). Innovative people are very interested in new technologies in general and in exploring new technologies' attributes in particular. Innovative people always want to own and utilise new technologies before they become common and owned by other people (Parasuraman, 2000; Parasuraman and Colby, 2018. Innovative people see the technology's functions positively (Lu et al., 2012; Mummalaneni et al., 2016). The closer they are to new technologies, the more useful they view new technologies (Larasati and Santosa, 2017; Walczuch et al., 2017). Studies have also pointed out the positive relationship between innovativeness and customer experience and technology acceptance (Kuo et al., 2022; Kang and Gretzel, 2012). Hotels are embracing technological innovations to achieve cost savings, increased speed, product flexibility, and increased profitability (Esen and Erdogmus, 2019). This move is consistent with innovative people' goals. Research has shown that there is a positive relationship between innovativeness and satisfaction (Pham et al., 2018; Wang et al., 2017).

2.2.3 Discomfort

Discomfort relates to perceived lack of control and a general feeling of being overwhelmed by the technology, which results in increased anxiety and

inhibits technology readiness and innovative adoption behaviour (Massey et al., 2017; Matthing et al., 2016). They are very anxious when being coped with new technologies (Parasuraman, 2020; Parasuraman and Colby, 2019). It measures the degree to which people have a general prejudice against technology based products and services. Similar effects are found in organisations operating in high-technology markets, which are characterised by considerable uncertainty due to the constant changing and heterogeneous nature of technology (Walczuch et al., 2017).

Technical readiness also determines how capable and comfortable a company is in adopting an innovation (Iacovou et al., 2019; Kuan and Chau, 2017). However, technical complexities inherent in dynamic web technologies demand technical skills and knowledge. A lack of technical competence and know-how is likely to inhibit an organisation's readiness to use new technologies. Researchers, Doherty et al. (2019; 2018) have found that retailers' negative perceptions relating to technical reliability and functionality augmented feelings of discomfort and insecurity when considering new technologies. Furthermore, where there is a lack of knowledge or expertise regarding the technology this may increase the firm's vulnerability and the perception of possible exploitation thus amplifying perceptions of risk and therefore inducing a lack of trust and commitment toward adopting or using the technology (Gefen, 2019; Pavlou, 2019). Overall, the perception of a lack of necessary resources to implement or improve web technology can increase feelings of uncertainty and risk and inhibit the readiness of organizations adopting new technologies (Daniel et al., 2020)

2.2.4 Insecurity

Insecurity can be defined as a lack of trust in technology and pessimism about the true capacity of technology to function precisely and reliably (Parasuraman, 2019; Parasuraman and Colby, 2019). In other words, insecurity represents the lack of confidence/trust towards new technologies and the scepticism in using technologies with new attributes (Parasuraman, 2020; Parasuraman and , 2019). Insecurity indicates a distrust of technology and scepticism about its ability to work properly. Such apprehensiveness results in individuals avoiding the use of technology due to an innate fear of technology (Lin and Hsieh, 2017). Recent investigations have found that firms adopting web technologies are likely to need new infrastructure and skills to facilitate the growth of this channel, which increases feelings of insecurity and therefore inhibits their readiness to embrace it as a channel to market (Jung-Yu and Chorng-Shyong, 2018; Weltevreden and Boschma, 2018). People with a sense of insecurity always have a fear when interacting with new technologies (Godoe and Johansen, 2022; Kwon, 2020). This group of people are often not satisfied with using new technologies (Parasuraman and Colby, 2018; Pham et al., 2018). Insecurity can lead to a lack of trust in new technology as well as a sense that the technology functions are not useful (Johnson et al., 2018; Larasati and Santosa, 2017). Insecurity that arises from the unsafe environment can make customers dissatisfied (Lin and Hsieh, 2017; Vize et al., 2018). It should be noted that a number of research studies have been conducted using the TRI 1.0 scale to examine if people's technology readiness have impacts on technology acceptance and adoption. The findings indicated that these impacts were statistically significant (Acheampong et al., 2017; Devaraj et al., 2008;

Erdogmus and Esen, 2019; Esen and Erdogmus, 2017; Godoe and Johansen, 2019; Kuo et al., 2018; Lin and Hsieh, 2017; Liu et al., 2017; McElroy et al., 2017; Mummalaneni et al., 2016; Odlum, 2016; Penz et al., 2017; Walczuch et al., 2017).

2.3 Smart supply chain

The processes of modern supply chain require best digitalization practices, latest technologies and technical solutions (Barykin et al., 2021b). The digital supply chain is the collective activities involved in the supply chain process among different customers and suppliers connected through advanced technologies. The digital supply chain increases data availability, interactions, collaboration and information about the market. This information allows the firm to enhance the usefulness, production and credibility of their products for the consumer (B€uy€uk€ozkan and G€oçer, 2018). Therefore, organizations worldwide attempt to give full attention to the implementation of digitalization in production and supply chain management to get the best benefits for the firms. The digital supply chain has provided many benefits to the firms, but many benefits are unexploited. There are many reasons for not exploiting the benefits of digitalization, such as upsetting the nature of the firm's transformation, or due to the negligence of managers (B€uy€uk€ozkan and G€oçer, 2018). To reap the benefits of the digital supply chain, it requires the amalgamation of digital instruments and strategies that interconnect the consumer to the supplier

and the entire body of workers with each other. There are two essential elements of the digital supply chain: one is digital transformation and the second is the integration of smart technologies (B€uy€uk€ozkan and G€oçer, 2018; Nasiri et al., 2020).

2.4 Smart Supply Chain Performance

Prior studies have discussed the potential of blockchain to positively affect supply chain performance in terms of several indicators (Hald and Kinra, 2019; Nandi et al., 2020; Sheel and Nath, 2019; Wang et al., 2019b). In our study, we consider five generic supply chain performance indicators based on Slack and Lewis (2017): Speed refers to doing things fast. It can be measured as the time between the beginning and the end of a process. The scope of this process may involve all operational steps, from the arrival of a customer order to the final delivery of the product or service (i.e. order lead time) or only one or a few steps (e.g. production lead time). Quality refers to doing things right. More specifically, it relates to how well a process can yield products or services that meet customer specifications. Quality also refers to the ability of processes to deliver products or services reliably and consistently according to specifications. Cost refers to doing things cheaply. It involves all financial inputs required for designing and operating the processes that produce products or services. Dependability refers to keeping promises. These

promises can be related to the right quantity, at the right place, at the right time. Dependability may concern the delivery of products and services but also of information related to the product or service, or to intermediary process steps in creating the product or service. Flexibility refers to being able to change. This can be broadly divided into range flexibility and response flexibility. Range flexibility concerns the extent to which a process can be changed. Response flexibility relates to how fast the process can be changed. Processes can be flexible in terms of product mix, volume and/or delivery.

2.5 Research Framework

Based on the work from Venkatesh et. al. (2003), the researcher had developed the research framework to study the influence of technology readiness on smart supply chain performance in manufacturing firms. Whereby, it consists of three independent variables there were the factors that will influence the technology readiness smart supply chain performance which were optimism, innovativeness , discomfort. The dependent variable for this research framework was smart supply chain performance in manufacturing firms. Figure 2.2 showed the research framework which the factors that will influence the technology readiness on use intention toward smart supply chain in manufacturing firms.

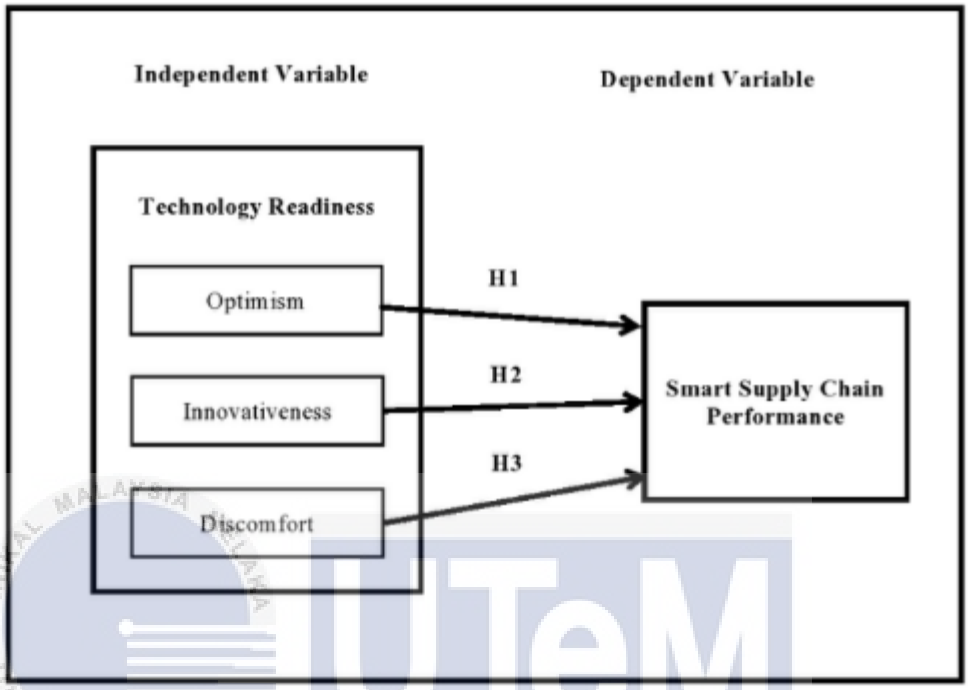

Figure 2.1: Research Framework

2.6 Hypothesis Testing

There were three hypotheses which could be constructed according to the proposed framework in Figure 1. Hypothesis was:

Optimism

H0: There is no significant relationship between optimism and smart supply chain performance in manufacturing firms.

H1: There is a significant relationship between optimism and smart supply chain performance in manufacturing firms.

Innovativeness

H0: There is no significant relationship between innovativeness and smart supply chain performance in manufacturing firms.

H1:There is a significant relationship between innovativeness and smart supply chain performance in manufacturing firms.

Discomfort

H0: There is no significant relationship between discomfort and smart supply chain performance in manufacturing firms.

H1: There is a significant relationship between and smart supply chain performance in manufacturing firms.

2.7 Summary

Before the researcher does this research, the researcher needs to know a literature review about everything related to the topic. This is made the researcher get more understanding about past research related to this topic. Furthermore, in this chapter, the researcher examined the definition of digital supply chain, firm performance, the effect of digital supply chain on firm performance, and the elements of firm performance, all of which are based on previous research. The researcher received the studied conceptual framework from Björkdahl (2020) but modified it to suit the research variables, which included independent variables and dependent variable. Finally, the researcher developed some hypothesis testing to assess the link between the independent variables and the dependent variable

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter will be discussing all the methodology that will be carried out in this research. Other than that, this chapter will tell about the choice of methods that will be applied by the researcher to achieve the objective. According to (Kartik Sreedharan Kumaresan and Muhamad Zameri Mat Saman, 2011), research methods will explain how the objectives will be achieved by using methods that have been selected. Quantitative data is collected and categorized in the collection of primary and secondary data. Information obtained from the survey will be analyzed using a specific method and the results of this study will be presented. After that, the role of data and how the data collected will also be discussed in this chapter and the types of research methods and data collection will be described. These are the chapter deals

with the design of the research and include reason for collecting the data and data analysis. Finally, methods of data analysis will be reviewed to get the best results.

3.2 Research Design

This research study deliberate relationship between mental health contributing factors and work productivity for employee. Churchill & Iacobucci (2017), characterize research design the outline that's taken after to complete the study" and it "ensures that the think about is important to the problem and will utilize economical procedure". Saunders (2019), stated that the design of the research is the common arrange which encompass the questions of the research, the objectives of the research and indicated the location for the sources used for gathering the data and examine it. This is considered to be the set of some of the processes and approaches utilized when gathering and assessing the variable measures in investigating the issue and seeking for the resolutions of the study quizzes.

Research purpose and research questions are the proposed beginning focuses to create a research design since they provide important clues around the substance that a researcher is pointing to assess (Yin 2016). Research strategy comprises of some 3 kinds. These are explanatory research, descriptive research, and exploratory research (Borgers, 2017). However, for the case of this study, explanatory research design was chosen being the theoretical framework which has been established and

intended by the scholars. This design shows that the secondary as well as primary data were examined from the present and previous case studies and in the end explore the influence of technology readiness on smart supply chain performance in manufacturing firms from the previous researches.

3.3 Methodological Choice

Leedy & Ormrod (2018) define research methodology as the general technique the researcher takes in the point out the research project. There are three tamous methods of conducting research which is quantitative, qualitative and mixed methods (Carrie William, 2017). Qualitative research is a primarily exploratory method. Qualitative research is a type of social science research that regains and works with non-numerical data. It also used to get an understanding of motivations, opinions and underlying reasons. Some usual methods include individual interviews, focus groups (group discussions), and participation/observations. The respondents are chosen to achieve a given quota and the sample is usually small.

Meanwhile, a quantitative research method is used to quantify the problem by way of creating numerical data or data that can be transformed into usable statistics. The problem that wants to quantify is attitudes, behaviors, opinions, and other defined variables to generalize results from a larger sample population. Another method is mixed methods research. Mixed methods research is a methodology for handling research that includes collecting, analyzing and integrating quantitative and

qualitative research. This method of study is also used to provide better thinking about research problems.

For this research, the researcher chooses a quantitative method. Quantitative research is used as a guide in collecting data and analyzing data based on the analyzing data. Quantitative method is a technique was to investigate the study via secondary data, questionnaire, sampling the data and research instrument. Quantitative method is the best way to get data to precede this research. It is because the researcher can create many questions with big sample size. Quantitative research also includes information accumulation that is commonly numeric and analyst tends to utilize scientific models as the system of information analysis. The researcher will utilize the questionnaire strategies to guarantee arrangement with measurable information accumulation system. The questionnare was related to the topic that is about the influence of technology readiness on smart supply chain performance in manufacturing firms.

3.4 Data Collection

Data collections are required for gathering and measuring information on variables of concern. After that, it is the systematic procedure that allows one to answer stated research questions, test hypotheses, and evaluate outcomes. There are two kinds of data which are primary and secondary. Primary data is the data that is collected first hand by the researcher himself, without depending on any kind of pre-researched information. Mainstream primary data collection techniques are population and sampling technique and also questionnaires. Meanwhile, secondary data is the data which is collected from other means, instead of the researchers. While for the secondary data is information that has been gathered by researches and recorded in books, articles and other publications.

3.4.1 Questionnaire Development

The processes of collecting and analyzing data in the research need to be supported by the questionnaire. The questionnaire is a collection of questions asked to the target respondents. Both open and close-ended questions can be used to design the questionnaire. The researcher was designed a set of questionnaire to generate the information needed to achieve research objectives. The questionnaire should be short and direct to ensure the respondent understood the questionnaire clearly. The researcher needs to know the step to develop the questionnaire. Firstly, the researcher needs to determine the demographic questions that needed in the research such as

gender, age, race, city area and education of the respondent. Second, the researcher will create the question base on both the independent variable and the dependent variable in this study. Next, the questionnaire will be checked by the supervisor. Finally, after questionnaires have been approved by the supervisor, the questionnaire can be spread out to the respondent. The questionnaire was designed to highlight investigate the influence of technology readiness on smart supply chain performance in manufacturing firms.

The questionnaire was administered through drop off and picks a method or by email the questionnaire depending on the availability of respondents. Construction of this study measured using a ten-point interval scale. According to Zainudin, 2014,), the seven-point interval scale was used to give respondents wider response options that suit their final decision. This scale is also designed to examine how strongly subjects has accepted the statements on the scale with anchors thus: 1 (Strongly Disagree) to 7 (Strongly Agree).

3.4.2 Sampling size

For the selection process, the researcher used the simple random sampling method. In this simple sample, everyone can be selected by random selection, with the random numbers allowed to select the sample without prejudices, according to

Saunders, Lewis, and Thornhill (2016). The sample possibility approaches include cluster sampling, multi-phase sampling, random stratified sampling, simple random sample sampling, and random systemic sampling. Simple random sampling is best suited to this study since the possibility of the sample is easy to identify.

Besides, the two types of sampling designs are probability sampling and nonprobability sampling. In this research, the researcher chooses sampling probability as the sampling technique. There have been probability samples where all persons in a population can be selected equally. The researcher used probability sampling to make a preference of the sample to answer the investigation question. In addition, randomly approximately 361 questionnaires were distributed to the employee by Google Form in manufacturing firm.

3.4.3 Population and Sample Size

A population is a whole number of people or other inhabitant in a country or region that gathered for the purposes of data gathering. The researcher gathers data from a sample size in order to collect information and analyzed a large population. This research was carried out based on manufacturing firms population in Malaysia. As the population in Malaysia almost 1,000, 000, based Bartlett, Kotrlik, & Higgins Table, the minimum required sample size for this research have been determined which is consists 119 people of continuous data with alpha = 0.05 and t=1.96.

3.4.4 Research Location

For completing this research, the researcher had decided to focus on Malaysia. In this research the researcher will get the data collection on manufacturing firms in Malaysia. From that, the researcher will get the variety of answer of the data collection, at the same time the researcher also will get different opinion because manufacturing firms is divided into various industries such as food manufacturing, textile mills, chemical manufacturing, apparel manufacturing and others. The researcher also will get respondent from different level position in manufacturing firms company.

3.5 Data Analysis

In this research, for collecting data, Statistic Package for Social Science (SPSS) software will be used. This software will use after all the questionnaire has been collected from the target respondent. the data will be inserted in the SPSS and all the information will be analysed through the frequency, mean and standard deviation.

The researcher used this software because of its flexibility to use for data analysis. Other than that, the researcher chooses this software because it can make result in detail and it is easy to make the conclusion of the research study.

3.5.1 Validity Analysis

This analysis used by the researcher to test the range of results accuracy from the research. Saunders (2012) defined that validity is the scale to which data collection method accurately measure what they were intended to measure. The validity of this research is to measure the strength of a linear association between two variables (X and Y) and is denoted by r, giving a value +1 and -1 inclusive, where 1 is a total positive correlation, O is no correlation, and -1 is a negative correlation. There are two types of validity which are internal validity and external validity.

3.5.1.1 Internal Validity

Internal validity is used to measure the accuracy and reducing confuse. It analysed the independent variables that cause the effects on the dependent variables or not. During observation of the effect, the researcher will found difficulties to draw conclusions about relationship between variables if there were influence of irrelevant variables. To conclude, internal validity guaranteed based on the range of avoiding errors in the research.

3.5.1.2 External Validity

External validity was analysis used to test whether the results of the research can be generalized or not. The most important issues to use external validity were to identify whether the researcher be able to reproduce a study that contains similar results with original study. The research need to be test repeatedly to evaluate the external consistency.

3.5.2 Reliability Analysis

Reliability is the tendency toward firmness found in repeated measurements. By determining the association between the scores obtained from different administrations of the scale, the researcher can obtain the proportion of systematic variation in a scale. Today, the famous reliability statistics used is Cronbach's alpha (Cronbach, 1951).

3.5.3 Cronbach's Alpha

Cronbach's alpha was a statistic calculation from the pair wise correlations between items that measured internal consistency. Internal consistency ranges between negative infinity and one. Coefficient alpha will be negative whenever there is greater within subject variability than between-subject variability. Besides that, if the analysis showed very high reliabilities 0.95 or higher, it was not necessarily benefits as it shows that the items may be excessive. The example of good internal consistency shows in the survey if respondents answered the same for each question. The more different answers given showed a sign that the questions were not properly explained in words and the respondents have difficulty in answering the questions.

Table 3.1: Cronbach's Alpha Coefficient Range and Strength of AssociationSource: (Saunders, Lewis & Thornhill, 2016)

Cronbach's Alpha Coefficient Range	Strength of Association
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

3.5.4 Multiple Regressions

The multiple regressions is a statistical technique that analysis relationship between several independent variables towards the independent variables. These analysis techniques that use two or more of variables of independent variables are correlated with one and with the dependent variables. In addition, this methods help researcher looks which of three variables more significant over other variables. The general form of the multiple regressions model in the research is as follow:

Equation: $y = a + bx1 + cx2 + dx3$

Where:

Table 3.2: Equation of Multiple Regression Analysis

y	Dependent Variable (Employee Behavioral Intention toward Business Intelligence system)
a	Constant value/Other influences
b	Influence of x1 (Performance Expectancy)
c	Influence of x2 (Effort Expectancy)
d	Influence of x3 (Social Influence)
x1, x2, x3	Independent Variables

3.6 Pilot Test

A pilot study is carried out that replicates all of the procedures of the main study and validates the feasibility of the study by evaluating the inclusion and exclusion criteria of the participants, preparation of the drugs and intervention, storage and testing of the instruments used for measurements in the study, and training of researchers and research assistants (Benger, Coates, Davies, Greenwood, Nolan & Rhys, 2016).

The pilot test may reveal errors and weaknesses in the questionnaire, allowing the questionnaire to be changed before it is distributed to respondents. The pilot test would collect recommendations and information from respondents in order to create a final survey questionnaire. Due to scheduling constraints, at least 30 individuals have been recruited for the pilot test.

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3.7 Time horizon

Time horizon is an arrangement of numerical data collected at regular intervals over a period of time. This time horizon can be shown on yearly, monthly, weekly or daily basis. Time horizon in this study is to conduct the progression of the research in analyzing the factors influencing online purchasing using social media among Generation Y. Researcher have the duration of 9 months to complete this research started from September 2016 until June 2017 and all the progression of this research had been constructed in a Gantt Chart which contains the activities in this research according to a given timeframe. Researcher used 4 months to complete the proposal and the rest 5 months is used to completing the research by gathering and analyzing the data and get the finding results for this research.

TIME / TASK	WEEKS														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Finding and discussion on the research topic and supervisor															
Finalizing and approval the title research by supervisor															
Formulating the research questions and research objectives															
Identify the variables and constructing the theoretical framework															
Studying and finding the sources for secondary data															
Determining the methodology to be used in the research															
Drafting the research proposal															
Submission and do correction for the final proposal															
Prepare proposal presentation															
Presentation proposal															

TIME / TASK	WEEKS																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Pilot Test																	
Distribute Questionnaire																	
Data Collection																	
Data Analysis																	
Recommendation and Conclusions																	
Submit Final Year Project																	
Final Presentation																	

Table 3.3 : Gantt chart of timeline research for PSM 1

3.8 Summary

As conclusion of this chapter, research methodology that being designed 15 very important. The data and information will be gathered using quantitative method. Data or information gathered as a rule to produce some sort of structured procedure. For questionnaire development, the sampling has been determined. The target respondents are manufacturing firms in Malaysia. The minimum sample size of this research is 119 respondents of manufacturing firms in Malaysia. This chapter also has described in detail the research methodology that has to collect data and analyze the necessary data. As conclusion, the all of the data that had been obtained whether primary or secondary data will be take down and recorded. In the chapter, all the data obtained will be analyzed and the outcomes of the data can be determined.

CHAPTER 4

ANALYSIS AND DISCUSION

4.1 Introduction

This chapter will discuss the outcomes of a questionnaire from a response to the titled which is the influence of technology readiness on use intention toward smart supply chain in manufacturing firms. The SPSS software will be used to code and enter all of the questionnaire results. After then, the data will be analyzed and interpreted. In this case, the pilot test will begin followed by descriptive analysis, Pearson's correlation coefficient, and multiple regression analysis. All of the questionnaire's questions had been assured to be answered by all of the respondents with no blanks on the questionnaire. All data collected will be analyzed in table form using the Windows software version SPSS 27.0.

4.2 Pilot Test

Pilot Test is characterized as a form of software testing that verifies in real time a component of the system or the entire system. A pilot test promotes decision-making and thus acts as 'a small-scale experiment or collection of observations

conducted to assess how and when a full-scale project should be launched (Collins English Dictionary, 2014). In addition, pilot test ensures that the respondents understand the questions and complete the questionnaires that had been submitted. Pilot testing is essential to ensure the research's performance was running smoothly.

All the association between all independent variables and dependent variables revealed by pilot test. There had 20 respondents chosen by using survey questionnaire to perform the pilot test. Table 4.1 show the Cronbach's Alpha of the pilot test and the first output (Case Processing Summary) show the valid data was 20 respondents while the missing data was zero. It showed that all data was processed.

Table 4.1: Reliability Statistics

(Sources: SPSS Output

Reliability Statistics		
Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**N of Items**
.907	**.908**	**30**

Cronbach's Alpha was 0.908 which were obtained from reliability statistics. Saunders et al. (2016) stated that the values of 0.70 or above indicate that the questions are being measured in the same scale. The value of 0.907 >0.70, showed the questionnaire was reliable.

4.3 Descriptive Statistics of Demographic Background

The research applied descriptive statistics in this study to assess the demographic background of the 120 respondents. In this part, the respondent's backgrounds are analyzed including company name, ownership, name, job title, department, working experience, contact number and e-mail.

4.3.1 Ownership

Table 4.2: Ownership of Respondents

(Sources: SPSS Output)

Ownership

		Frequency	Percent
Valid	Local Company	113	94
	Foreign Company	7	6
	Total	120	100.0

Table 4.2 shows that the gender of all 120 respondents who were answering the Questionnaires. It shows that the total for local company were 113 respondents which were 94% from the total, while the total for foreign company was 7 respondents which were 6% from the total. The total of local company was more than foreign company. The percentage of local company wer was higher than foreign company.

Figure 4.1: Ownership of Respondents

4.3.2 Job Title

Table 4.3: Job Title of Respondents

(Sources: SPSS Output)

Job Title

		Frequency	Percent
Valid	CEO	12	10
	Manager	38	32
	Executive Officer	40	33
	Others	30	25
	Total	120	100.0

Table 4.5 indicated the jon tittle of all 120 respondents in their company. The highest total of 40 respondents with the percentage of 33% was from the Executive officer. 38 respondents were from manager level with the percentage of 32%. 30 respondents were from others with the percentage of 25%. The lowest total of only 12 respondents with the percentage of 10% was from the CEO.

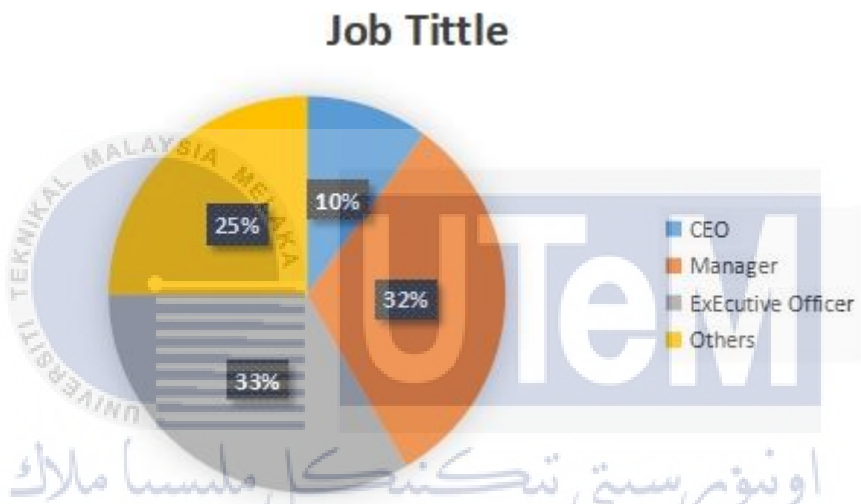

Figure 4.2: Job Title of Respondents

4.3.3 Department

Table 4.4: Department of Respondents

(Sources: SPSS Output)

Department

		Frequency	Percent
Valid	Administration	18	15
	Sales & Marketing	30	25
	Operation	17	14
	Finance	12	10
	Others	43	36
	Total	120	100.0

Table 4.4 shows that the department of all 120 respondents who were answering the questionnaires. Most of the respondents were from the Bachelor's others department with represent 43 respondents with 36%. There were 30 respondents which from Sales & Marketing department with 25% of the total of all respondents. The number of the respondents which is from the administration is 18 respondents with 15% of the total of respondents. There were 17 respondents which from operation department with 14% of the total of all respondents. There were only 12 respondents from finance department with 10% of the total of respondents.

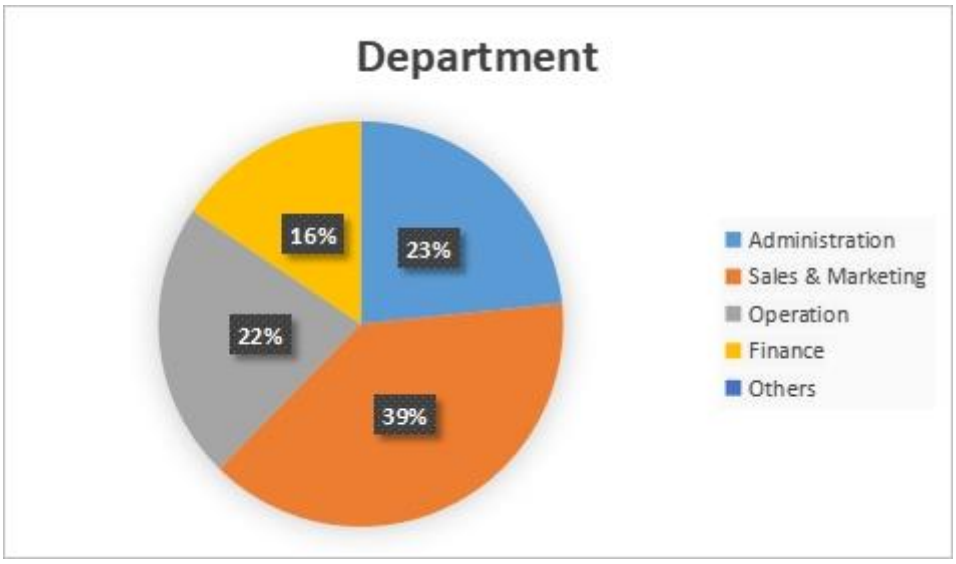

Figure 4.3: Department of Respondents

4.3.4 Working Experiences

Table 4.5: Working experiences of Respondents

(Sources: SPSS Output)

Working experiences

		Frequency	Percent
Valid	Below 05 years	18	15
	05 - 10 years	25	21
	11 - 15 years	36	30
	16 - 20 years	26	22
	Above 20 years	15	12
	Total	120	100.0

Table 4.6 indicated that the range for the duration of work experiences for all the 120 respondents. The highest total of 36 respondents with the percentage of 30% has the 11 to 15 years of working experiences. Then, it followed by 26 respondents with the percentage of 22% which has between 16 to 20 years of working experiences. Next, 25 respondents with the percentage of 21% has between 5 to 10 years of working experiences. Then, it followed by 18 respondents with the percentage of 15% which has below 5 years of working experiences. Lastly, the lowest total of 15 respondents with the percentage of 12% has above 20 years of working experiences.

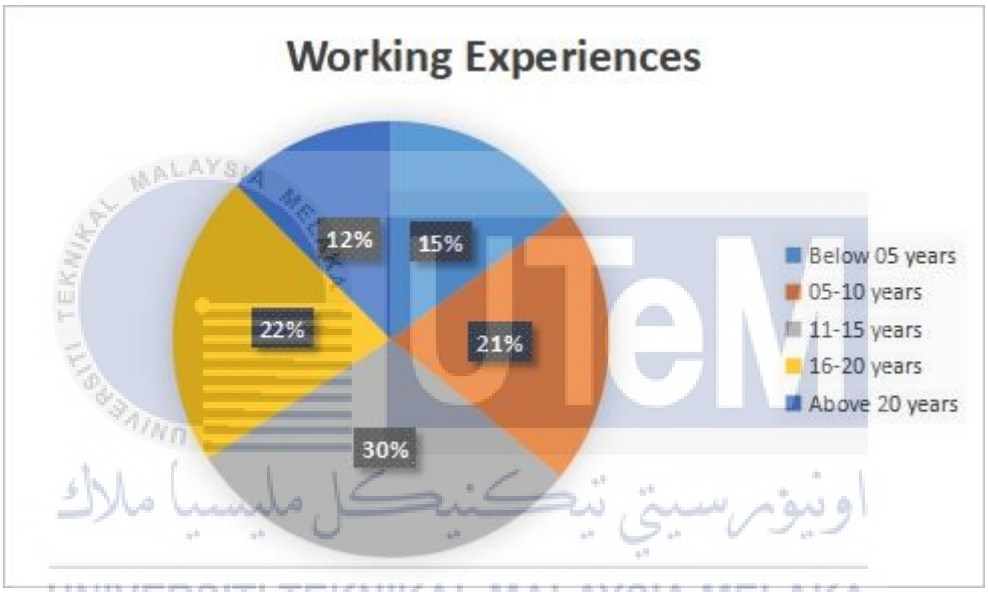

Figure 4.4: Department of Respondents

4.4 Descriptive Statistics

Descriptive statistics are used in research to characterize the fundamental characteristics of data. They provide concise summaries of the sample and measurements. They are the foundation of almost any quantitative data analysis, as well as simple graphical analysis.

In this case, the researcher employed a five-point Likert Scale to identify the positive effects when using the six-sigma methodology to minimize problems in the

healthcare industry. The Likert Scale will be a five-point rating scale, with 1 signifying strongly disagree, 2 showings disagree, 3 suggesting neutral, 4 expressing agree and 5 representing strongly agree.

Table 4.6: Descriptive Statistics for Independent Variables

(Source: SPSS Output)

Descriptive Statistics

Descriptive Statistics		
Independent Variables	Mean	Std. Deviation
Optimism	4.9041	0.69293
Innovativeness	4.7488	0.85238
Discomfort	4.8099	0.69994

Table 4.7 above shows the descriptive statistics analysis for the three independent variables that were significant in optimism, innovativeness, and discomfort. According to the table above, the highest mean value is 4.9041, which represents optimism. The second highest mean was 4.8099, which was followed by discomfort. Apart from that, the lowest mean is the last place from all the means is 4.8100 represented by innovativeness.

Furthermore, standard deviation reflects how accurate the interpretation of the data is and how the answer collects. As a result, the standard deviation for innovativeness is 0.85238. This means that this independent variable comes first out of all the independent variables listed above. Discomfort also pushes it to second place for standard deviation, which is 0.69994. The third spot of standard deviation is 0.69293, which represents optimism.

.

Table 4.7: Descriptive Statistics of Dependent Variable

(Source: SPSS Output)

Descriptive Statistics		
	Mean	Std. Deviation
Intense to use toward Smart supply chain	4.8067	0.64365

Table 4.8 above shows the descriptive statistics of the dependent variable which is the intense to use toward Smart supply chain. According to the table above, the mean value for the dependent variable is 4.8067 and the standard deviation value is 0.64365.

4.4.1 Descriptive Statistic of Independent Variable 1 (IV1)

Table 4.8: Descriptive Statistics of Optimism

(Source: SPSS Output)

Statistics

	Mean	Std. Deviation
New technologies contribute to a better quality of life	4.74	0.55
Technology gives more freedom of mobility	4.76	0.68
You can usually figure out new high-tech products and services without help from others	4.52	0.85

When you get technical support from a provider of a high-tech product or service, you sometimes feel as if you are being taken advantage of by someone who knows more than you do	4.68	0.75
Technical support lines are helpful because they explain things in understandable terms	4.75	0.69

The table 4.6 showed that optimism is one of the factors that influencing use intention toward smart supply chain. It showed from the table that the mean values of each problem are as similar as possible and that the standard deviations are also the same condition. The respondent answers the ranking questions from 1 (strongly disagree) to 7 (strongly agree).

Question 2 scored the highest mean with the value 4.76 because most of the respondents think that technology gives more freedom of mobility. Then the question

5 follows with the value 4.75 due to respondents agree technical support lines are helpful because they explain things in understandable terms. The third and fourth highest mean value is question 1 and

4 with the value 4.74 and 4.68. However, the lowest mean value is question 3 with the

value 4.52 that showed respondent disapprove can usually figure out new high-tech products and services without help from others.

The highest value of standard deviation was the question 3 which is 0.85. The

lowest standard deviation was the question 1 which is 0.55 which means the data is

more reliable. However, the average standard deviation of this five question was about 0.55 to 0.85.

4.4.2 Descriptive Statistic of Independent Variable 2 (IV2)

Table 4.9: Descriptive Statistics of Innovativeness

(Source: SPSS Output)

Statistics

Descriptive Statistics

	Mean	Std. Deviation
Technology gives more control over daily lives	4.62	0.81
Technology makes more productive	4.70	0.71
Other people come to you for advice on new technologies	4.71	0.68
In general, you are the first in your circle of friends to acquire new technology when it appears	4.34	0.92
You keep up with the latest technological developments	4.75	0.67

The table 4.7 above showed the innovativeness is one of the factors that influencing use intention toward smart supply chain Through the table above, it showed the highest mean value is the question 5 with 4.75. This is because the respondents agree that technology readiness can keep up with the latest technological developments. Then the second and third highest mean value is the question 3 and 2 which is 4.71 and 4.70 due to the respondents think that technology makes more productiv. The fourth highest value mean value is the question 1 with 4.62 showed respondent agree that technology gives more control over daily lives. Then, the lowest mean value is

question 4 with 4.34 that respondents respond that they are the first in their circle of friends to acquire new technology when it appears.

Question 4 showed the highest standard deviation was 0.92 and Question 1 with 0.81 was the next highest standard deviation value. Question 4 had the highest standard deviation value which meant that the findings were less reliable. The third highest standard deviation was question 2 with 0.71 and question 3 with the value 0.68 was the fourth lowest. Question 5 was the lowest value of standard deviation as the value 0.67. So question 3 were be more reliable compare to others

4.4.3 Descriptive Statistic of Independent Variable 3 (IV3)

Table 4.10: Descriptive Statistics of Discomfort

(Source: SPSS Output)

Statistics

Descriptive Statistics

	Mean	Std. Deviation
Sometimes, you think that technology systems are NOT designed for use by ordinary people	4.82	0.445
There is no such thing as a manual for a high-tech product or service that's written in plain language	4.81	0.442
Too much technology distracts people to a point that is harmful	4.80	0.472
Technology lowers the quality of relationships by reducing personal interaction	4.83	0.428
You do not feel confident doing business with a place that can only be reached online	4.80	0.446

Table 4.12 was shown the descriptive statistics of the third independent variable which discomfort. As you can see from the table, numerous questions have the same mean value. Firstly, the highest score mean value is for question 4 with 4.83. Technology lowers the quality of relationships by reducing personal interaction.The second highest mean value is 4.82 for question 1. Technology systems are not designed for use by ordinary people. Following that, the third-highest score has the mean value of 4.81 for question 2. In this situation ,There is no such thing as a manual for a high-tech product or service that's written in plain language. The lowest and final score was presented by questions 3 and 5, which is only 4.80 because they do not feel confident doing business with a place that can only be reached online

In terms of standard deviation, question 3 has the highest score of 0.472. This suggests that question 3 was less reliable. Question 5 and will take second place in terms of standard deviation, with a value of 0.446 followed by question 1 with 0.445. The answer to question 2 is 0.442 for the third value of standard deviation. Finally, questions 4 have the lowest standard deviation value with 0.428 and it has grown more reliable than the others.

4.5 Result of Measurement

Researchers were supervised by this section to examine the relationship between the dependent variable and the independent variable used in the study. Connection was rendered by validity and reliability of dependent variable and independent variables that had been used.

4.5.1 Validity Test

The Pearson Correlation test was used to describe the relationship between independent and dependent variables. According to Saunders et al. (2016), the correlation coefficient may be used to determine the strength of the relationship between independent and dependent variables. Table 4.15 shows that the Pearson's Correlation Coefficients for the interpreting correlation range of the R-Values. Table 4.16 below shows Pearson's Correlation Coefficients between the dependent variables and independent variables.

Table 4.11: Range of Pearson's Correlation Coefficients and the Interpretation

(Source: Saunders et. al., 2016)

Pearson's Correlation Coefficient (R-values)	Interpretation
±0.70 to ±1.0	Very strong relationship
±0.40 to ±0.69	Strong relationship
±0.30 to ± 0.39	Moderate relationship
±0.20 to ±0.29	Weak relationship
±0.01 to ±0.19	No relationship

Table 4.12: Correlations between Variables

(Sources: SPSS Output)

Correlations

		OPTIMISM	INNOVATIVENESS	DISCOMFORT	DV
OPTIMISM	Pearson Correlation	1	.700**	.635**	.714**
	Sig. (2-tailed)		.000	.000	.000
	N	120	120	120	120
INNOVATIVENESS	Pearson Correlation	.700**	1	.725**	.796**
	Sig. (2-tailed)	.000		.000	.000
	N	120	120	120	120
DISCOMFORT	Pearson Correlation	.635**	.725**	1	.704**
	Sig. (2-tailed)	.000	.000		.000
	N	120	120	120	120
Intense to use toward Smart supply chain (DV)	Pearson Correlation	.714**	.796**	.704**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	120	120	120	120

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

Table 4.16 has shown the correlations between the dependent variable and independent variables. All the independent variables and dependent variables above have a unique relationship, and it was defined using Pearson's Correlation Coefficients. According to Saunders et. al., (2015), the Pearson's Correlation Coefficients may describe the strength of the relationship between independent variables and dependent variables.

According to the table above, the correlation of optimism, innovativeness and discomfort were categorized as positive relation intense to use toward smart supply chain as correlation values are 0.714, 0.796 and 0.704 respectively.

As for the first independent variable above, it was optimism with a 0.714 correlation coefficient (r) value. The second value of correlation for innovativeness is 0.796. Next, the correlation value of discomfort are 0.704 respectively. According to the result of the correlation value, all the independent variables had a very strong positive relationship with the dependent variable. This is because the results showed the correlation coefficient (r) value was higher than 0.5 and the significant level was 0.000 which was ($p<0.05$).

According to the table below, the relationship between all three independent variables and dependent variables is positive. It revealed that all of the independent variables were related to the Intense to use toward smart supply chains dependent variable.

4.5.2 Reliability Test

According to Saunders et. al., (2016), reliability is defined as replication and consistency. Besides, the reliability is also the data collected is determined by the test of reliability, Heffiner (2014). Furthermore, reliability is the accuracy of the sample, which the survey questionnaire may classify. The Cronbach's Alpha result is used in the reliability test to determine whether the items in the questionnaire are positively . The level of reliability applied in this research was measured by a set of numbers in the Cronbach's Alpha Coefficient. Table 4.17 below shows the range of Cronbach's Alpha coefficients and the strength of correlation.

Table 4.13: Cronbach's Alpha Coefficient Range and Strength of Association

(Sources: Saunders et. al., 2016)

Cronbach's Alpha Coefficient Range	Strength of Association
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

This research contained 30 questions using Likert Scales to determine the level of agreement. The scale ranged from 1 to 7, with 1 = Strongly Disagree, 2 = Disagree, 3 =Somewhat disagree, 4 =Neither agree nor disagree, 5 =Somewhat agree, 6 = Agree and 7 = Strongly agree. For all questions, the reliability test was completed, and the reliability results are provided below.

Table 4.14: Case Processing Summary

(Sources: SPSS Output)

Case Processing Summary

Case Processing Summary

		N	%
Cases	Valid	120	100.0
	Excluded[a]	0	.0
	Total	120	100.0

a. Listwise deletion based on all variables in the procedure.

Table 4.15: Reliability Test for Independent Variables and Dependent Variable

(Sources: SPSS Output)

Reliability Statistics

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.862	.862	30

For this research, the table 4.14 showed the reliability test for both dependent variable and independent variables. There were 15 independent variable questions, and 15 dependent variable questions. On these questions the Cronbach Alpha was at 0.862. The result of those questions has been successful and acceptable.

4.6 Hypothesis Testing

The research requires hypothesis testing in this section to evaluate whether or not the developed hypothesis may be accepted or rejected. The researcher uses Multiple Regression Analysis to test the study hypothesis. Multiple regression analysis was required to investigate the relationship between a dependent variable and independent variables. The significant level was determined and presented as a range of values as a result of the multiple regression analysis. This states that if the level is greater than 0.05, the level is irrelevant because the maximum significant level of the variable was 0.00. This study, it is also consisting of three sections in the Multiple Regression Analysis, which are Model Summary, ANOVA, and coefficient.

4.7.1 Multiple Regression Analysis

Table 4.16: Multiple Regression Analysis

(Source: SPSS Output)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.836[a]	.699	.691	.41328

Table 4.20 above shows the result of Multiple Regression Analysis for Model Summary is related in this research. It is demonstrated the relationship between the independent variables and dependent variables. The value of the correlation coefficient (R) was 0.836 and the value of the coefficient of the determinant (R Square) was 0.699. According to the result above, both values mean there was a strong relationship between the variables. They suggested that intense to use toward Smart supply chain got 69.9% that influence by optimism, innovativeness and discomfort. Another (100%-69.9% = 30.1%) was influenced by the other factors that are not been done in this research.

4.7.2 Multiple Regression Analysis (ANNOVA)

Table 4.17: Multiple Regression Analysis (ANOVA)

(Source: SPSS Output)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.378	3	15.459	90.511	.000[b]
	Residual	19.984	117	.171		
	Total	66.362	120			

a. Dependent Variable: DV

b. Predictors: (Constant), DISCOMFORT, OPTIMISM, INNOVATIVENESS

Multiple Regression Analysis (MRA) is a model that good fit of the data and result from the output. It can help the researcher to predict the value of a variable based on two or more others variables. The probability level of significant value showed was 0.000. The probability of significant value is 0.000 which was lower than 0.05, so multiple regression models may be used to estimate that intense to use toward Smart supply chain. The factor of independent variables of technology readiness is optimism, innovativeness and discomfort.

Table 4.18: Multiple Regression Analysis (Coefficients)

(Sources: SPSS Output)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.986	.258		3.819	.000		
	OPTIMISM	.242	.069	.258	3.501	.001	.475	2.104
	INNOVATIVENESS	.368	.064	.471	5.716	.000	.378	2.643
	DISCOMFORT	.185	.071	.199	2.605	.010	.443	2.259

a. Dependent Variable: DV

Based on the table 4.17, the linear equation was developed as follow:

$$Y=0.986+0.242\ X1+0.368\ X2+0.185X3$$

Where Y= intense to use toward Smart supply chain

X1= Optimism

X2= Innovativeness

X3= Discomfort

Based on the linear equation above, all the independent variable had a positive relationship which were optimism, innovativeness and discomfort objectives as the intense to use toward Smart supply chain in manufacturing firms.

4.7 Summary of Hypotheses

Optimism

H_0: There is no significant relationship between optimism and intention to use on smart supply chain in manufacturing firms.

H_1: There is a significant relationship between optimism and intention to use on smart supply chain in manufacturing firms.

As from the table above, the result of optimism and intention to use on smart supply chain in manufacturing firms was shown. The significant value of optimism is 0.001>0.05. In this case, it can be assumed that optimism had significant relationship with the intention to use on smart supply chain in manufacturing firms. Therefore, the researcher had to accept the alternative hypotheses (H1) and reject the null hypotheses (H0).

Innovativeness

H_0: There is no significant relationship between innovativeness and intention to use on smart supply chain in manufacturing firms.

H_1: There is a significant relationship between innovativeness and intention to use on smart supply chain in manufacturing firms.

As from the table above, the result of innovativeness and intention to use on smart supply chain in manufacturing firms was shown. The significant value of inovativeness is 0.000>0.05. In this case, it can be assumed that innovativeness had significant relationship with the intention to use on smart supply chain in manufacturing firms. Therefore, the researcher had to accept the alternative hypotheses (H2) and reject the null hypotheses (H0).

Discomfort

H_0: There is no significant relationship between discomfort and intention to use on smart supply chain in manufacturing firms.

H_1: There is a significant relationship between discomfort and intention to use on smart supply chain in manufacturing firms.

As from the table above, the result of discomfort and intention to use on smart supply chain in manufacturing firms was shown. The significant value of discomfort is 0.010>0.05. In this case, it can be assumed that discomforts had significant relationship with the intention to use on smart supply chain in manufacturing firms. Therefore, the researcher had to accept the alternative hypotheses (H3) and reject the null hypotheses (H0).

4.7.1 Summary for Hypothesis

Table 4.19: Summary for Hypothesis

Hypothesis	Results
H1 : There is a significant relationship between innovativeness and intention to use on smart supply chain in manufacturing firms.	Accepted
H2 : There is a significant relationship between innovativeness and intention to use on smart supply chain in manufacturing firms.	Accepted
H3 : There is a significant relationship between innovativeness and intention to use on smart supply chain in manufacturing firms.	Accepted

4.8 Conclusion

In this chapter, the researcher analyzed all the recently collected data using the Windows software version SPSS 27.0. Tables and figures were used to display all the results. In this chapter, a pilot test, descriptive statistics, Pearson's Correlation Coefficient, Multiple Regression Analysis, and hypothesis testing have previously been performed to evaluate the collected data. In this case, the researcher discovered that three hypotheses were acceptable, and none were rejected.

CHAPTER 5

DISCUSSION, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

The result from the data analysis in Chapter 4 was discussed in this chapter. The researcher will explain the data and the result of the research study that had been analyzed. In this chapter, the part of demographic, research objectives, implication of study, limitation of study and recommendations of future study will be discussed in this chapter.

5.2 Summary of the Study

The purpose of the research is the influence of technology readiness on use intention toward smart supply chain in manufacturing firms. In this research, there have three independent variables such as optimism, innovativeness,and discomfort in the smart supply chain in manufacturing firms.

5.3 Discussion on the Demographic Background

The total of the respondents for this research were 120 respondents. The total for respondents from local company was 102 respondents (94%) from the total higher than the number of respondents froms foreign company which were 7 respondents (6%) from the total.

As for the job title, there was the highest population for job position which is executive officer respondents in this research. The job position of executive officer was representing 40 respondents or 33%.The second-highest job position of respondents is manager. The manager 38 respondents or 32%. The total of respondents for others job position is about 30 respondents or 25%. The lowest total of respondents is represented by CEO position which are only 12 respondents and 10% of the total of respondents.

Next, there were 43 respondents or 36% who from others department. For the sales & marketing depatment, 30 respondents and 25% had answered the research survey.Overall, 18 respondents were from the administration department, with a percentage of 15 %. There were 17 respondents at the operation department, accounting for 14 % of the total. Last, finance department had the lowest respondents which are 12 respondents (10%).

In addition, for the range of the duration of work experiences, 11 years to 15 years of working experience had the largest total of 36 responses with a percentage of 30%. Then there were 26 responses with a rate of 22 % who had between 16 to 20 years of working experience. Following that, 25 respondents (21%) had worked for between 5 to 10 years working experiences. Then there were 18 responses with a rate of 15% who had below 5 years of working experience.Finally, the lowest total of 15 respondents, with a proportion of 12%, had worked for 20 years or more.

5.4 Discussion on Research Objectives

The research objectives were stated as below:

i . To identify the factors that influencing use intention toward smart supply chain.

ii. To analyze the relationship between technology readiness on use intention and smart supply chain.

iii. To suggest the appropriate way for manufacturing firms to adopt technology readiness.

Research Objective 1: To identify the factors that influencing use intention toward smart supply chain.

For the first research objective, the researcher has identified the factor that influencing use intention toward smart supply chain in manufacturing firms from the literature review. The researcher has used the resource-based view (RBV) model in this research. The researcher explained the relationship between the independent variables which aretechnology readiness and the dependent variable is intention to use toward Smart supply chain. All the independent variables which optimism, innovativenss and discomfort are the determinants in the RBV model that had seen as factors that influence the use intention toward smart supply chain from the previous study. Therefore, the objective 1 had been achieving.

Research Objective 2: To analyze the relationship between technology readiness on use intention and smart supply chain.

In the second research objective, the researcher had used SPSS software to prove the results of the explanatory factor. There are three independent variables

which were the technology readiness that affect the use intention toward smart supply chain . Through the hypothesis testing, there were three factors of technology readiness factors that affected use intention toward smart supply chain in manufacturing firms as they were significant with the dependent varables. However, there were none factors that rejected as a hypothesis. The technology readiness factors that been accepted were optimism, innovativeness and discomfort .The table below showed that the significant value of optimism, innovativeness and discomfort **,** were 0.001>0.05, 0.000>0.05, and 0.010>0.05. So, the multiple regression analysis can be assumed that optimism, innovativeness and discomfort had the significance relationship with use intention toward smart supply chain .

Table 5.1: Summary of Hypothesis Testing

(Resources: SPSS Output)

Hypothesis	Sig	Results
H1 : There is a significant relationship between innovativeness and intention to use on smart supply chain in manufacturing firms.	0.001>0.05	Accepted
H2 : There is a significant relationship between innovativeness and intention to use on smart supply chain in manufacturing firms.	0.000>0.05	Accepted
H3 : There is a significant relationship between innovativeness and intention to use on smart supply chain in manufacturing firms.	0.010>0.05	Accepted

Table 5.1 as above shown the significant value of optimism, innovativeness and discomfort were 0.001>0.05,0.000>0.05 and 0.010>0.05. In this case, the multiple

regression analysis can be assumed that optimism, innovativeness and discomfort had a significant relationship with the use intention toward smart supply chain.

Research Objective 3 : To suggest the appropriate way for manufacturing firms to adopt technology readiness

For the third research objective, the researcher has to suggest the appropriate way for manufacturing firms to adopt technology readiness. The first question required participants to indicate the factors that make them resist technology. Though this question was semi-structured, participants did not provide any comments pertaining to why they resist the use of technology. Based on the findings, the researcher suggests that manufacturing firms should have improved technological infrastructure so as to enhance productivity and job satisfaction in the workplace. his will, in turn, improve customers' satisfaction and organizational image. It is further recommended that an empirical study should be carried out in manufacturing firms to establish the impact of technology on employee motivation, job satisfaction and job productivity.

5.5 Implication of the Study

The findings of this research are analysed to achieved to achieve the research objective that can identify the relationship between the technology readiness and use intention toward smart supply chain inmanufacturing firms. The researcher had used SPSS software to analyse the collected data such as pilot test, Cronbach's Alpha, Descriptive Statistics, Correlations, Multiple Regression Analysis (MRA) and hypothesis testing to analyse the relationship of independent variables and dependent variable. In conclusion, the respondents were perceived the optimism, innovativeness and discomfort will affect the use intention toward smart supply chain in

manufacturing firms. Of the three factors that constitute technology readiness, optimism and innovativeness positively influence intention to use, and insecurity negatively influence intention to use. Optimism will help people believe in technology, have a sense of 'easy-to-use', and perceive benefits generated by the technology. Optimistic people believe that technology offers many values and useful functions for them to accomplish their tasks in the most effective and efficient way. Innovativeness is viewed as a trend towards being a technology and thought leader (Parasuraman, 2000; Parasuraman and Colby, 2014). It represents the level at which people want to experiment and use new technology products and services to become thought leaders on technology-related issues.

What guidelines does this analysis offer organisations wishing to sell technology solutions to their portfolio of current and potential manufacturing firms? Literature asserts that firms differ in their pace of innovation (Parasuramann, 2000). It is therefore worthwhile for these organisations to segment their client base or potential new clients on their Technology Readiness level or profile. This in turn will inform their sales and marketing approach. As Lin and Chang (2011) have suggested, differing customer segments with differing TR profiles vary significantly in terms of their technology behaviour. In this context marketers can target retailers where TR is likely to be higher and where such early adopters of new technologies (Iacavou et al., 1995) are more open to advice and expert assistance, and want to be at the cutting edge of new market technologies. Where TR is low and perceptions of discomfort and insecurity within firms is higher, these retailers may represent business accounts where return on investment for the company may be marginal.

The internet and advances in information and communication technology are revolutionising the interactions between employees in manufacturing firms (Wang et al., 2017). Optimistic and innovative consumer tend to believe in the usefulness of new technology in helping them complete their work in the most effective and efficient way. They desire to be technology pioneers and thought leaders. In other words, insecurity can be considered as a distrust of and a pessimism of the technology's ability to function precisely and reliably (Pham et al., 2018). Thus, this

group of people becomes suspicious about a new technology's functionality and resistant to adopting it.

Technology readiness has been demonstrated by many empirical studies to have impacts on use intention (Wang and Sparks, 2014). Under the view of Parasuraman (2000) and Parasuraman and Colby (2014), technology readiness is a multi-dimensional latent variable which consists of both motivating factors and inhibiting factors for technology acceptance and use. Motivating factors are 'optimism' and 'innovativeness' while inhibiting factors are 'discomfort' and 'insecurity'. Optimism can be considered as a positive view of technology by people, which can have positive impacts on customer satisfaction with technology usage (Huy et al., 2019; Lin and Hsieh, 2007; Pham et al., 2018; Thong et al., 2006

As discomfort arises from feeling overwhelmed by technology and inhibits TR (Massey et al., 2007) technology oriented organisations must address this with clients and take proactive steps to manage and decrease levels of discomfort perceived by clients. This may involve emphasising and demonstrating ease of use and application of the technology, maintaining simple and easy to navigate user interfaces or simply avoiding technical jargon in client discussions. Clients may also experience discomfort due to a perceived lack of resources to manage the technology once implemented and in this context on-line supports and customer back up facilities as well as options to offer staff training and education to client companies in the initial project stages need to be highlighted by the vendor.

5.6 Limitation of the Study

There are several limitations in conducting this research. The first limitation when conducting this research was time constraint, the researcher had a limited time which was three months of period to collect the data from the respondents so that the

researcher could not find more responses from the respondents. The researcher had collected the data by distributing the questionnaire through the email from October 2022 to December 2022. During conducting this research, the second limitation that faced by the research was the method of doing the survey. The survey method used by the researcher was more to the online platform which through the email, there was some difficulty for the respondents when they want to distribute the questionnaire to some companies such as they didn't have the exactly email of the company or the company did not reply for the email. The last limitation was the number of respondents. Only 120 of respondents data that were collected by the researcher in this study.g

5.7 Recommendations for Future Research

A few advice and solution that may be the researcher recommended to conduct similar research for future researchers. Recommendations can sole the current limitation that had been showed in the previous section. Approach from professional related with the industry were encourage to future researchers. The reason is time constraints for researcher to distribute and collect the questionnaire from the respondents. The industry knowledge and opinion will give by the professional and this can help researchers saving more time in gathering data and completing the research.

Digital platform also be encouraged for future researcher to distribute and collect their questionnaire from the respondents. The reason is because the researcher need to collect the questionnaire from different states in the short time.

Future researcher will save time to make more valuable and useful findings for technology readiness in use intention towards smart supply chain in manufacturing firms. By using the digital platform, the respondents from different states can share their experiences on the basis of the difference in demographic profile easily. Future researcher is encouraged to use the empirical research to conduct the research. This is because empirical research is analyzing the technology readiness in use intention

towards smart supply chain in manufacturing firms by using the empirical evidence. Researcher can use the evidence to identify the hypothesis testing to evaluate the relationship between the technology readiness and use intention towards smart supply chain. The evidence can be collected by using observation and experience from the respondents.

Lastly, the coefficient of determination (R Square) is 0.699 This discussed that the technology readinesse is 69.9% influenced by the optimism, innovativenss and discomfort. The rest (100%-69.9%=30.1%) was explained by other factors. Therefore, the future researcher can explore more about technology readiness.

5.8 Conclusion

Studies on the adoption of new technologies are not new, however, studies relating to the adoption of smart technologies are relatively new considering the fact that smart technologies are also new. Technology readiness was theorized to be a causal antecedent of both perceived usefulness and perceived ease of use, which subsequently affect consumers' intentions to use smart supply chain in manufacturing firms. Perceived usefulness and perceived ease of use together had complete mediation effects between technology readiness and consumers' use intentions . TR has also been positively linked with enhancing overall service quality and satisfaction in the acceptance of self service technologies (Chen and Chen, 2009; Lin and Hsieh, 2007; Sheng et al., 2011). The next stage of this research aims to fill this gap and explores the influence of TR on service quality and satisfaction. The antecedents explored relate to retailers past experience with web solution providers, trust perceptions of operating in the online industry, and the perceived costs of switching to an alternative service provider.The TR Index developed could also be integrated as part of a larger Technology Adoption study to see if it moderates the relationships in extant studies. Longitudinal studies could also be conducted to

ascertain whether the management suggestions above in relation to risk and anxiety reduction and managing levels of discomfort and insecurity would be effective.

5.9 Summary

The three research objectives which are to identify the factors that influencing use intention toward smart supply chain., to analyze the relationship between technology readiness on use intention and smart supply chain and to suggest the appropriate way for manufacturing firms to adopt technology readiness had been achieved by the researcher. The implications of the study, limitations of the study, and recommendations for further research were all explored in this chapter.

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APPENDIX 1

GANTT CHART OF PSM 1

Year	2019/2020														
Task/Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PSM 1 Talk															
First Meeting with Supervisor															
Topic Discussion															
Topic Confirmation															
RQ & RO Construction															
Complete Chapter 1															
Complete Chapter 2															
Chapter 3 Drafting															
Complete Chapter 3															
Complete Chapter 4															
PSM 1 Submission															
PSM 1 Presentation															

APPENDIX 2

GANTT CHART OF PSM 2

Year	2019/2020														
Task/Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Create Questionnaire															
Distribute Questionnaire															
Data Gathering															
Data Analysing															
Complete Chapter 4															
Complete Chapter 5															
PSM 2 Submission															
PSM 2 Presentation															

APPENDIX 3

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ADOPTION OF BIG DATA ANALYTICS USING UTAUT2 MODEL APPROACH TOWARDS SMART SUPPLY CHAIN MANAGEMENT IN MANUFACTURING FIRMS

A process used to extract meaningful insights, such as hidden patterns, unknown correlations, market trends, and customer preferences for example While smart supply chain is supply chain that integrates the partners can self-organize and automatically adapt to environmental changes and makes an intelligent decision that best achieves business goals

By looking at the impact of big data analytics adopting on smart supply chain performance, a research work on the adoption of Big data analytics using UTAUT2 model is being carried out by the Faculty of Manufacturing Engineering, Universiti Teknikal Malaysia Melaka (UTeM).

Your cooperation is solicited in filling the questionnaire on behalf of your company. Please pass this questionnaire to the appropriate member (s) of your organization (at least 2-year experience in supply chain operations and use big data analytics (such as Management Information System (MIS), ERP, SAP, BAAN, cloud computing, etc.) in your daily work. If you do not feel comfortable to complete it.

You have been asked to take part in this study because you are an expert which has at least 2 years working experience in

The information given is **STRICTLY CONFIDENTIAL** and will be used only as a material for academic research.

A high response rate is vital for the success of this study. We would be delighted to answer any query regarding the questionnaire. Please return the completed questionnaire using the enclosed envelope.

Thank you for your time and kindness.

NOR RATNA BINTI MASROM
Faculty of Manufacturing Engineering,
University Teknikal Malaysia Melaka (UTeM),
76100 Hang Tuah Jaya, Melaka,
Malaysia.

QUESTIONNAIRE
[SOAL SELIDIK]

INSTRUCTION:
To complete this questionnaire, you are just required to TICK (✓) boxes and write in the space of the required information provided, if necessary.

[ARAHAN:
Untuk menjawab soal selidik ini, anda dikehendaki untuk menanda (✓) pada kotak jawapan dan menulis maklumat yang dikehendaki pada ruangan yang telah disediakan , jika perlu.]

SECTION A: INFORMATION ON THE SMART MANUFACTURING PRACTICE
[BAHAGIAN A: MAKLUMAT BERKAITAN AMALAN PENGILANGAN PINTAR]

What are your company's current smart manufacturing practices from the past two (2) years? Tick (✓) one answer for each statement as follows.
[Apakah amalan pengilangan pintar semasa di syarikat anda bagi tempoh dua (2) tahun yang lalu? Tandakan (✓) satu jawapan bagi setiap penrnyataan berikut.]

Strongly Disagree *(Sangat Tidak Setuju)* — Strongly Agree *(Sangat Setuju)*

1 — 7

	Statement *[Pernyataan]*	Scale *[Skala]*						
		1	2	3	4	5	6	7
SSP1	You company have Machines/systems can be controlled through IT *[Mesin/sistem boleh dikawal melalui IT]*	□	□	□	□	□	□	□
SSP2	You company uses Machine to Machine communication where transmission of machine data between mechanical or electronic devices can be done automatically without human intervention *[Syarikat anda menggunakan komunikasi Mesin ke Mesin di mana penghantaran data mesin antara peranti mekanikal atau elektronik boleh dilakukan secara automatik tanpa campur tangan manusia]*	□	□	□	□	□	□	□
SSP3	Your company is implementing Interoperability technology where it is able to connect and communicate in a coordinated way, without effort from the end user. *[Syarikat anda melaksanakan teknologi saling kendali di mana ia dapat menyambung dan berkomunikasi dengan cara yang diselaraskan, tanpa usaha dari pengguna akhir.]*	□	□	□	□	□	□	□
SSP4	Your company collects inventory data automatically *[Syarikat anda mengumpul data inventori secara automatik]*	□	□	□	□	□	□	□
SSP5	Your company collects Manufacturing throughout times automatically *[Syarikat anda mengumpul Pembuatan sepanjang masa secara automatik]*	□	□	□	□	□	□	□

SSP6	Your company collects equipment capacity utilization automatically *[Syarikat anda mengumpul penggunaan kapasiti peralatan secara automatik]*	□	□	□	□	□	□	□
SSP7	Your company collects Production residues/waste/WIP automatically *[Syarikat anda mengumpul sisa pengeluaran / sisa / WIP secara automatik]*	□	□	□	□	□	□	□
SSP8	Your company collects Employee utilization automatically *[Syarikat anda mengumpul penggunaan Pekerja secara automatik]*	□	□	□	□	□	□	□
SSP9	Your company collects Data about processing, process condition automatically *[Syarikat anda mengumpul Data tentang pemprosesan, keadaan proses secara automatik]*	□	□	□	□	□	□	□
SSP10	Your company collects Production times automatically *[Syarikat anda mengumpul masa Pengeluaran secara automatik]*	□	□	□	□	□	□	□
SSP11	Your company collects Overall equipment effectiveness (OEE) automatically *[Syarikat anda mengumpul keberkesanan peralatan keseluruhan (OEE) secara automatik]*	□	□	□	□	□	□	□
SSP12	Data you collect used for Predictive maintenance *[Data yang anda kumpulkan digunakan untuk penyelenggaraan Ramalan]*	□	□	□	□	□	□	□
SSP13	Data you collect used for Optimization of logistics and production processes *[Data yang anda kumpulkan digunakan untuk Pengoptimuman proses logistik dan pengeluaran]*	□	□	□	□	□	□	□
SSP14	Data you collect used for Creation of transparency across production process *[Data yang anda kumpulkan digunakan untuk Penciptaan ketelusan merentasi proses pengeluaran]*	□	□	□	□	□	□	□
SSP15	Data you collect used for Quality management *[Data yang anda kumpulkan digunakan untuk pengurusan kualiti]*	□	□	□	□	□	□	□
SSP16	Data you collect used for Optimization of resource consumption (material, energy) *[Data yang anda kumpulkan digunakan untuk Pengoptimuman penggunaan sumber (bahan, tenaga)]*	□	□	□	□	□	□	□
SSP17	Data you collect used for Automatic production control through use of real-time data *[Data yang anda kumpulkan digunakan untuk kawalan pengeluaran automatik melalui penggunaan data masa nyata]*	□	□	□	□	□	□	□
SSP18	Your company currently uses Manufacturing Execution System (MES) *[Syarikat anda kini menggunakan sistem pelaksanaan pembuatan (MES)]*	□	□	□	□	□	□	□

SSP19	Your company currently uses Enterprise Resource Planning (ERP) *[Syarikat anda kini menggunakan perancangan sumber perusahaan (ERP)]*	□	□	□	□	□	□	□
SSP20	Your company currently uses Product Lifecycle Management (PLM) *[Syarikat anda kini menggunakan pengurusan kitaran hayat produk (PLM)]*	□	□	□	□	□	□	□
SSP21	Your company currently uses Product Data Management (PDM) *[Syarikat anda kini menggunakan pengurusan data produk (PDM)]*	□	□	□	□	□	□	□
SSP22	Your company currently uses Production Planning System (PPS) *[Syarikat anda kini menggunakan sistem perancangan pengeluaran (PPS)]*	□	□	□	□	□	□	□
SSP23	Your company currently uses Production Data Acquisition (PDA) *[Syarikat anda kini menggunakan pemerolehan data pengeluaran (PDA)]*	□	□	□	□	□	□	□
SSP24	Your company currently uses Machine Data Collection (MDC) *[Syarikat anda kini menggunakan pengumpulan data mesin (MDC)]*	□	□	□	□	□	□	□
SSP25	Your company currently uses Computer-Aided Design (CAD) *[Syarikat anda kini menggunakan reka bentuk bantuan komputer (CAD)]*	□	□	□	□	□	□	□
SSP26	Your company currently uses Supply Chain Management (SCM) *[Syarikat anda kini menggunakan pengurusan rantaian bekalan (SCM)]*	□	□	□	□	□	□	□

SECTION C: INFORMATION ON THE BIG DATA ANALYTICS PERCEIVED RISK
[BAHAGIAN C: MAKLUMAT BERKAITAN RISIKO ANALITIK DATARAYA YANG DIRASAKAN]

What are your current perceived risk in big data analytics in your company from the past two (2) years? Tick (✓) one answer for each statement as follows.
[Apakah risiko yang dirasakan di dalam analitik dataraya di syarikat anda bagi tempoh dua (2) tahun yang lalu? Tandakan (✓) satu jawapan bagi setiap pernyataan berikut.]

Strongly Disagree *(Sangat Tidak Setuju)* → Strongly Agree *(Sangat Setuju)*

1 — 7

PR1	Could be malfunctioning and by obtaining wrong data could lead the company to make wrong decisions *Mungkin tidak berfungsi dan dengan mendapatkan data yang salah boleh menyebabkan syarikat membuat keputusan yang salah*	□	□	□	□	□	□	□
PR2	Unsafe to protect company's data *Tidak selamat untuk melindungi data syarikat*	□	□	□	□	□	□	□
PR3	The probability of something going wrong with the performance of Big Data Analytics implementation is high *Kebarangkalian sesuatu yang tidak kena dengan prestasi pelaksanaan Analitik Dataraya adalah tinggi*	□	□	□	□	□	□	□
PR4	Considering the expected level of performance of Big Data Analytics, using it would be very risky for company *Memandangkan tahap prestasi Analitik Dataraya yang dijangkakan, menggunakannya akan menjadi sangat berisiko bagi syarikat*	□	□	□	□	□	□	□
PR5	Provide company with erroneous data *Menyediakan syarikat dengan data yang salah*	□	□	□	□	□	□	□
PR6	The chances of company losing money using Big Data Analytics are very high *Peluang syarikat kehilangan wang menggunakan Analitik Dataraya adalah sangat tinggi*	□	□	□	□	□	□	□
PR7	Waste time by having to install new type of software *Buang masa dengan perlu memasang jenis perisian baru*	□	□	□	□	□	□	□
PR8	Generate inconveniences since a lot of time would have to be spent solving errors *Menjana kesulitan kerana banyak masa perlu dibelanjakan untuk menyelesaikan kesilapan*	□	□	□	□	□	□	□
PR9	Considering the investment in time and start-up of the System, such investment would be risk *Memandangkan pelaburan dalam masa dan permulaan Sistem, pelaburan tersebut akan menjadi risiko*	□	□	□	□	□	□	□
PR10	The probability of wasting time with system start-up and learning is very high *Kebarangkalian membuang masa dengan permulaan sistem dan pembelajaran sangat tinggi*	□	□	□	□	□	□	□
PR11	Conflict with company's concept *Konflik di dalam Kesesuaian dengan konsep syarikat*	□	□	□	□	□	□	□

PR12	Company's business concept will get worse and suffer a loss of reputation *Konsep perniagaan syarikat akan menjadi lebih teruk dan mengalami kehilangan reputasi*	□	□	□	□	□	□	□
PR13	The probability of using Big Data Analytics and losing control of data privacy is high *Kebarangkalian menggunakan Analitik Dataraya dan kehilangan kawalan privasi data adalah tinggi*	□	□	□	□	□	□	□
PR14	Using Big Data Analytics will lead to loss of privacy *Menggunakan Analitik Dataraya akan menyebabkan kehilangan privasi*	□	□	□	□	□	□	□
PR15	Using Big Data Analytics is globally risky *Menggunakan Analitik Dataraya adalah berisiko di seluruh dunia*	□	□	□	□	□	□	□
PR16	It is dangerous to use Big Data Analytics *Adalah berbahaya untuk menggunakan Analitik Dataraya*	□	□	□	□	□	□	□
PR17	Using *Analitik Dataraya* exposes our company to risk *Menggunakan Analitik Dataraya mendedahkan syarikat kami kepada risiko*	□	□	□	□	□	□	□

SECTION D: INFORMATION ON THE TECHNOLOGY READINESS
[BAHAGIAN D: MAKLUMAT BERKAITAN KESEDIAAN TEKNOLOGI]

What is your company's current in technology readiness from the past two (2) years? Tick (✓) one answer for each statement as follows.
[Apakah kesediaan teknologi syarikat anda bagi tempoh dua (2) tahun yang lalu? Tandakan (✓) satu jawapan bagi setiap penyataan berikut.]

Strongly Disagree
(Sangat Tidak Setuju)

Strongly Agree
(Sangat Setuju)

1 ——— 7

	Statement *[Pernyataan]*	*Scale [Skala]*						
		1	2	3	4	5	6	7
TR1	New technologies contribute to a better quality of life *Teknologi baru menyumbang kepada kualiti hidup yang lebih baik*	□	□	□	□	□	□	□
TR2	Technology gives more freedom of mobility *Teknologi memberikan lebih banyak kebebasan mobility*	□	□	□	□	□	□	□
TR3	Technology gives more control over daily lives *Teknologi memberi lebih banyak kawalan ke atas kehidupan seharian*	□	□	□	□	□	□	□
TR4	Technology makes more productive *Teknologi menjadikan lebih produktif*	□	□	□	□	□	□	□
TR5	Other people come to you for advice on new technologies *Orang lain datang kepada anda untuk mendapatkan nasihat mengenai teknologi baru*	□	□	□	□	□	□	□
TR6	In general, you are the first in your circle of friends to acquire new technology when it appears *Secara umum, anda adalah yang pertama dalam kalangan rakan anda untuk memperoleh teknologi baru apabila ia muncul*	□	□	□	□	□	□	□
TR7	You can usually figure out new high-tech products and services without help from others *Anda biasanya boleh memikirkan produk dan perkhidmatan berteknologi tinggi baru tanpa bantuan daripada orang lain*	□	□	□	□	□	□	□
TR8	You keep up with the latest technological developments *Anda mengikuti perkembangan teknologi terkini*	□	□	□	□	□	□	□
TR9	When you get technical support from a provider of a high-tech product or service, you sometimes feel as if you are being taken advantage of by someone who knows more than you do *Apabila anda mendapat sokongan teknikal daripada pembekal produk atau perkhidmatan berteknologi tinggi, kadang-kadang anda merasa seolah-olah anda diambil kesempatan oleh seseorang yang tahu lebih banyak daripada yang anda lakukan*	□	□	□	□	□	□	□

TR10	Technical support lines are helpful because they explain things in understandable terms *Talian sokongan teknikal membantu kerana mereka menerangkan perkara dalam istilah yang dapat difahami*	□	□	□	□	□	□	□
TR11	Sometimes, you think that technology systems are NOT designed for use by ordinary people *Kadang-kadang, anda fikir bahawa sistem teknologi TIDAK direka untuk digunakan oleh orang biasa*	□	□	□	□	□	□	□
TR12	There is no such thing as a manual for a high-tech product or service that's written in plain language *Tidak ada manual untuk produk atau perkhidmatan berteknologi tinggi yang ditulis dalam bahasa biasa*	□	□	□	□	□	□	□
TR13	Too much technology distracts people to a point that is harmful *Terlalu banyak teknologi mengalihkan perhatian orang ke titik yang berbahaya*	□	□	□	□	□	□	□
TR14	Technology lowers the quality of relationships by reducing personal interaction *Teknologi merendahkan kualiti hubungan dengan mengurangkan interaksi peribadi*	□	□	□	□	□	□	□
TR15	You do not feel confident doing business with a place that can only be reached online *Anda tidak yakin menjalankan perniagaan dengan tempat yang hanya dapat dicapai dalam talian*	□	□	□	□	□	□	□

SECTION E: INFORMATION ON THE CURRENT ON SMART SUPPLY CHAIN PERFORMANCES
[BAHAGIAN E: MAKLUMAT BERKAITAN PRESTASI RANGKAIAN BEKALAN PINTAR SEMASA]

What are your company's current smart supply chain performances from the past two (2) years? Tick (✓) one answer for each statement as follows.
[Apakah prestasi rangkaian bekalan pintar syarikat anda bagi tempoh dua (2) tahun yang lalu? Tandakan (✓) satu jawapan bagi setiap penrnyataan berikut.]

Strongly Disagree *(Sangat Tidak Setuju)* — Strongly Agree *(Sangat Setuju)*

1 — 7

	Statement *[Pernyataan]*	Scale *[Skala]*						
		1	2	3	4	5	6	7
SSM1	The exchange of information will give better quality relationships with supply chain partners. *[Pertukaran maklumat akan memberikan hubungan yang lebih berkualiti dengan rakan kongsi rantaian bekalan.]*	□	□	□	□	□	□	□
SSM2	The involvement of stakeholders will give better decisions to produce new products. *[Penglibatan pihak berkepentingan akan memberikan keputusan yang lebih baik untuk menghasilkan produk baharu.]*	□	□	□	□	□	□	□
SSM3	The use of value stream mapping will identify and eliminate waste throughout the supply chain. *[Penggunaan pemetaan aliran nilai akan mengenal pasti dan menghapuskan sisa sepanjang rantaian bekalan]*	□	□	□	□	□	□	□
SSM4	Your supply chain will generate high stock turnover and minimizes inventory *[Rantaian bekalan anda akan menjana pusing ganti stok yang tinggi dan meminimumkan inventori]*	□	□	□	□	□	□	□
SSM5	Your supply chain can forecast customer demands. *[Rantaian bekalan anda boleh meramalkan permintaan pelanggan.]*	□	□	□	□	□	□	□
SSM6	Adequate information systems linkages exist with partners in the supply chain network. *[Hubungan sistem maklumat yang mencukupi wujud dengan rakan kongsi dalam rangkaian rantaian bekalan.]*	□	□	□	□	□	□	□
SSM7	The information exchange will help the establishment of business planning with the supply chain partners. *[Pertukaran maklumat akan membantu penubuhan perancangan perniagaan dengan rakan kongsi rantaian bekalan.]*	□	□	□	□	□	□	□
SSM8	Your company will have enough information to understand the skills and competencies of the supplier. *[Syarikat anda akan mempunyai maklumat yang mencukupi untuk memahami kemahiran dan kecekapan pembekal.]*	□	□	□	□	□	□	□

SSM9	Your company can replace one supply source with another at a low cost. *[Syarikat anda boleh menggantikan satu sumber bekalan dengan yang lain pada kos yang rendah.]*	□	□	□	□	□	□	□
SSM10	Integrated technology improved your supply chain management. *[Teknologi bersepadu meningkatkan pengurusan rantaian bekalan anda.]*	□	□	□	□	□	□	□
SSM11	Real-time enterprise improved your monitoring capabilities *[Operasi masa nyata meningkatkan keupayaan pemantauan anda]*	□	□	□	□	□	□	□
SSM12	Inventory levels are visible throughout the supply chain. *[Tahap inventori boleh dilihat di seluruh rantaian bekalan.]*	□	□	□	□	□	□	□
SSM13	Demand levels are visible throughout the supply chain. *[Tahap permintaan boleh dilihat di seluruh rantaian bekalan.]*	□	□	□	□	□	□	□
SSM14	The use of smart processes facilitates planning, sourcing, making and delivering goods. *[Penggunaan proses pintar memudahkan perancangan, penyumberan, pembuatan dan penghantaran barangan.]*	□	□	□	□	□	□	□
SSM15	The use of devices gives the activation of monitoring the proper handling conditions of goods *[Penggunaan peranti memberikan pengaktifan pemantauan keadaan pengendalian barang yang betul]*	□	□	□	□	□	□	□
SSM16	Smart processes provide more accurate information for effective decision making *[Proses pintar menyediakan maklumat yang lebih tepat untuk membuat keputusan yang berkesan]*	□	□	□	□	□	□	□

GENERAL INFORMATION
[MAKLUMAT AM]

1. Company Name: _____
   [Nama Syarikat:]

2. Ownership: ☐ Local (Malaysia) ☐ Foreign, please specify :_____
   [Pemilikan :] *[Syarikat tempatan]* *[Syarikat asing, sila nyatakan:]*

Respondents Information:
[Maklumat Responden:]

Name : _____
[Nama]

Job title : _____
[Jawatan]

Department : _____
[Jabatan]

Working experience (years) : _____
[Pengalaman kerja (tahun)]

Contact number : _____
[Number untuk dihubungi]

E-mail : _____
[Emel]

Would you like to receive a concise summary of the results from the survey?
[Adakah anda berminat untuk mendapatkan keputusan kajian tinjauan ?

☐ Yes ☐ Tidak
[Ya] *[No]*

Would you like to take part in the next phase of this study?
[Adakah anda ingin mengambil bahagian untuk fasa seterusnya dalam kajian ini ?

☐ Yes ☐ Tidak
[Ya] *[No]*

Thank you very much for your time and kind-co-operation. Please ensure that you answer as many question as possible. For analysis purpose, please return the questionnaire even if your company is not engage in cleaner production and lean production practice in your production activities.

[Terima kasih untuk masa dan kerjasama anda. Sila pastikan bahawa anda menjawab sebanyak soalan yang mungkin. Bagi tujuan analisis, sila kembalikan borang tinjuan ini walaupun syarikat anda tidak melibarkan diri dalam amalan pengeluaran bersih dan pengeluaran lean dalam aktiviti pengeluaran anda.]

---------- **END OF SURVEY**----------
(Kaji selidik Tamat)

GLOSSARY

	Statement	*Definition*
1.	**Supply chain** ***Rantaian bekalan***	A systematic approach to managing flows of assets from sourcing raw materials, and product manufacturing, to delivering to end customers significantly affects the business goals of the partners in supply networks. *Pendekatan sistematik untuk menguruskan aliran aset dari sumber bahan mentah, dan pembuatan produk, untuk menyampaikan kepada pelanggan akhir memberi kesan ketara kepada matlamat perniagaan rakan kongsi dalam rangkaian bekalan.*
2.	**Smart supply chain** ***Rantaian bekalan pintar***	A supply chain that integrates the partners can self-organize and automatically adapt to environmental changes and makes an intelligent decision that best achieves business goals *Rantaian bekalan yang mengintegrasikan rakan kongsi boleh mengatur sendiri dan secara automatik menyesuaikan diri dengan perubahan alam sekitar dan membuat keputusan pintar yang terbaik mencapai matlamat perniagaan*
3	**Supply chain partner** ***Rakan kongsi rantaian bekalan***	Successful long-term relationships amongst trading partners in the supply chain that are enabled by mutual trust, organizational compatibility, top management support, and information sharing *Hubungan jangka panjang yang berjaya di kalangan rakan perdagangan dalam rantaian bekalan yang diaktifkan oleh kepercayaan bersama, keserasian organisasi, sokongan pengurusan atasan, dan perkongsian maklumat*
4	**supply chain performance** **Prestasi rantaian bekalan**	The ability of a supply chain to cost-effectively carry out its activities while minimizing costs, for the main purpose of meeting the ultimate customer's needs *Keupayaan rantaian bekalan untuk menjalankan aktivitinya dengan kos efektif sambil meminimumkan kos, untuk tujuan utama memenuhi keperluan pelanggan utama*