FACTORS INFLUENCING INTERNET OF THINGS (IoT) ACCEPTANCE IN SUPPLY CHAIN MANAGEMENT (SCM) OF SEMICONDUCTOR INDUSTRY IN MALAYSIA'S SOUTHERN REGION

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A PROJECT PAPER SUBMITTED IN FULFILLMENT OF THE REQUIREMENTS FOR THE BACHELOR DEGREE IN TECHNOLOGY MANAGEMENT (INNOVATION TECHNOLOGY) WITH HONOURS.

FACULTY OF TECHNOLOGY MANAGEMENT AND TECHNOPRENEURSHIP
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DECLARATION

I hereby declare that this research study is the result of my own and independent work excluding the summary and experts that have been specifically acknowledged.

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ACKNOWLEDGEMENT

First of all, I would like to express all my gratitude to Allah SWT for His opportunity and blessings that have lead and enable me to complete this research study within the timeframe despite all the challenges and problems that arise throughout the process. Apart from that, I would like to send my gratitude to my lovable parents and family that always being there to encourage and give their full support and love to me either physically or spiritually to complete this journey. All the hard times seems easy to be go through with their endless support which become my strength to finish this research.

Besides, I would also like to thank my supervisor, Prof Madya Dr. Juhaini Binti Jabar for always being there to help me in producing a good quality research project, motivating me when I am not confident with myself and always guiding me to keep on the right track. In addition, I am also feel very thankful to my lecturers and friends that always give me a help and motivation when I faced difficulties to complete this research.

Last but not least, I would also like to express my appreciation to my special person for his continuous motivation through ups and downs, together with his belief that I am able to complete this research successfully. Once again, I am grateful and thankful for all their loves, kindness and spiritual support that will remain as one of the sweetest memory in this journey all the time.

ABSTRACT

In our worlds nowadays, technology are keep emerging and developing which offer a new way in facilitating daily life in terms of process, management, sharing information, knowledge transfer and research and development. Distant are no more a barrier with the aid of technology to keep us connected and linked to each other. In recent years, we can monitor that Internet of Things (IoT) are rapidly grow and enhance the integration with almost all existing technology in our daily activities and process. Internet of Things (IoT) is an aid of technology that covered and developed successfully in many industries such as manufacturing industries, health, education, transportation and engineering. Besides, Internet of Thing (IoT) also gives advantage and act as a catalyst in growth of semiconductor industry in Malaysia. IoT can be accepted in semiconductor industry, as an example in supply chain management (SCM). Supply chain management is an interconnected network that brought people, information, data, process and activity either in local or worldwide together. In addition, the implementation of IoT also improves supply chain management process in terms of the supplier relationship management, customer service, planning and procurement and also production system. As supply chain management is a continuous process, therefore the acceptance of Internet of Things (IoT) will help in improving and sustaining the competitive advantage of an industry among the rival competitors in the markets.

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|CHAPTER 1

INTRODUCTION

Chapter 1 explains a brief summary of the study conducted through this research. This chapter aimed to explain in details on the background, problem statement, research questions, and research objectives, significant of study, scope and limitation. Besides, researcher also clarifies the definition terms include in this research study.

1.1 Background of Study

Today, in the period of 2015-2019, semiconductor industry in Malaysia is expected to grow and becoming Malaysia's largest sector in manufacturing industry. (UPE Alliance Group, 2016). Besides, the worldwide semiconductor industry was predicted to grow with annual growth rate of about 15% from 2015-2019. (Bernama, 2016). In Malaysia, there are more than 50 semiconductor companies have establish their production site here as this country is a vital electronics and electrical (E&E) manufacturer and a host to international, multinational companies and also local companies. (UPE Alliance Group, 2016).

As an example, the international companies that choose to invest their business in Malaysia's semiconductor industry are Infineon, Texas Instruments, FairChaild Semiconductor and STMicroelectronics. (UPE Alliance Group, 2016). In addition, the foreign investment in this industry is not only open up 780,000 job vacancies but also becoming the largest contributor that accounted 85% of the RM182 billion in total investment with more than 40% of Malaysia electronics and electrical exports

(Bernama, 2016). Besides, with the total exports of 35.6% in 2015 with more than 12% of world installing capability, Malaysia are leading on becoming global choice for semiconductor test operations and assembly parts. (Bernama, 2016).

In maintaining the growth development and sustaining the competitive advantage in this industry, Malaysia semiconductor industry need to enhance their provision and start to implement smart manufacturing by using Internet of Things (IoT). (Bernama, 2016). Internet of Things (IoT) is the major element in managing industrial transformation worldwide which involving all industries including manufacturing industries.

Semiconductor industries are also manufacturing goods by covering up several types of operations and processes with continuous flow of information and activities with the aid from people, machine and others. The process involve in semiconductor industries by transforming raw material into finished goods are also connected with supply chains, logistics and transportations. All these elements and processes are importantly to be managed with Internet of Things (IoT) as one of the efficient and integrated approach. (i-Scoop, 2016).

In the future, IoT will restructure the supply chain management of a semiconductor company in managing their business locally and internationally. They need to set up a technology that will support their supply chain's process and cloud computing needs together with the connection between suppliers and customers in the long term period. (Allan Carr et al, 2013). Supply chain management (SCM) is a dynamic management of supply chain activities to build up the highest consumer value and attain a sustainable competitive advantage (SCRC, 2017). In 2015, it was predicted that IoT Technologies in supply chain management and logistics sector, as an example asset tracking solutions will act as a device for better resolution and money and time saving and would also give impact of more than $1.9 trillion in this operation sector. (DHL, Cisco, 2015).

Besides, IoT are becoming a platform of digital transformation when 70% of retail and manufacturing companies including semiconductor companies are adjusting the way they manage their operations and delivery of goods to consumer together with the integration of cloud services and analystics (GT Nexus,Capgemini, 2016). Supply chain is a relationship that builds up between suppliers and customers with the

continuous physical and information flows (Rob Hanfield. 2002).Challenges in conducting peoples and all sections in supply chain in managing the interconnected value system within the organization will continuously come out and give an effect on the performance. (Rob Hanfield, 2002).

Information systems and technology are already developed and available which can be implemented in the supply chain management as an attempt to reduce the failure due to lack of communication and challenges in structuring the relationship among diverse personalities within the organization. Today, with the technological advances there are various technology application readily to be accepted by an organization as a tool in managing an effective supply chain management and enhance the performance, as an example Computerized Shipping and Tracking (Flash Global) and Radio Frequency Identification (RFID). (Andrew Meola, 2016). The innovative technology application will help the semiconductor industries to have a clearer way in managing business ahead and lead them to achieve customer satisfaction and enhance their supply chain performance (Flash Global, 2017).

1.2 Problem Statement

Supply chain management is the interconnected process and information where an organization develops to convert raw material into final product while ensuring that the supply chain is cost-effective and efficient. (It Info,2017). Today, challenges to sustain an efficient and effective supply chain performance are continuously growing. (Frank Anderson, 2017). The challenges that usually arise while managing a supply chain, as an example are customer service, cost control, planning and risk management and supplier relationship management. (Frank Anderson, 2017). As semiconductor industries in Malaysia are going forward, the supply chain process needs to be well structured and managed.

Customer is always a priority for an organization to ensure sustainability in the current market. Besides, the supply chain management also struggling to minimize the operating cost under rising pressure such as floating fuel and freight costs, large

number of customers worldwide, rapid changing technology and new regulations and rising commodity price. (Frank Anderson, 2017).

As an example, shipping is one of the most important elements in supply chain operation. Shipping itself act as an engine that operates the world, global business and economy. Some of the problems that might complicate the shipment process and at the same time affect the supply chain operations in semiconductor industries in terms of receiving raw materials from suppliers and delivering finished goods to customers. The major challenge in shipping process without the aid of technology is the data entry errors. As the data entry process happens daily from time to time and recording all the important information done by human, it might be not perfectly accurate and mistakes can arise everywhere. Thus, the aid from technology application from the acceptance of Internet of Things (IoT) can help to minimize mistakes like this form happen again. (Chadwick Heard, 2016).

This study is to identify the level of acceptance Internet of Things in supply chain management of semiconductor industry. Most of the companies in this industry are still lack in awareness that there are technology application developed to help them managing supply chain operation systematically, time and cost saving, efficient and effective with minor mistakes and disruption. Internet of Things (IoT) act as a platform that prepared various technology application that ready to be accepted by supply chain department of an organization as semiconductor industries are growing fast in Malaysia recently. Due to this scenario, semiconductor industries need to prepare themselves with technology that will facilitate the supply chain operations in order to face the upcoming challenges in the future.

Besides, some organizations in supply chain of semiconductor industries also faced problems in managing relationship between suppliers and customers. The flow of information, need and understand from both relationship is important for better creation and development of performance and opportunities to improve. (RBW Logistics, 2017). Next, problems might also occur such as the disruption in delivery process of goods to customer, as an example late carrier arrival or damaged of goods while handling it will interrupt the warehouse's schedule and production process. At this critical period, the important information need to be communicate throughout each

section of supply chain management so that they can quickly adjust to the situation and minimize the cost of time and money to correct it. (Chadwick Heard, 2017).

The aim of this study is to identify the factors of technology acceptance in supply chain management of semiconductor industry. The acknowledgement and awareness on importance of Internet of Things (IoT) especially in the acceptance of technology application must be spread thoroughly among all workers that involve in supply chain of semiconductor industries. This step is very important so that the common challenges and mistakes that usually arise while managing the supply chain operations can be reduced.

Recently, the technology application is easy to obtained and accept by a company and it is also come with supervision from the specialist in that particular area. By accepting the Internet of Things (IoT) and start choosing the most suitable technology application from various choices available nowadays, it might increase the level of productivity of the organization and keep them sustain in the challenging industries with strong, cost effective and efficient supply chain management. The further research will discover and answered the technology acceptance by supply chain management of semiconductor industries in Malaysia's southern region.

1.3 Research Question

This study is to answer the following major question:

RQ1. What is the technology acceptance factor for Internet of Things (IoT)?

RQ2. What is the relationship of acceptance factor towards attitude to use IoT?

RQ3. What is the most influential acceptance factor towards attitude of using IoT?

1.4 Research Objective

This study is to achieve this research objective:

RO1. To identify the technology acceptance factor for Internet of Things (IoT).

RO2. To study the relationship of acceptance factors towards attitude to use IoT.

RO3. To identify the most influential acceptance factor towards attitude of using IoT.

1.5 Significance of Study

The purpose of this study is to identify the acceptance level of Internet of Things (IoT) in supply chain management of semiconductor industry in Malaysia's southern region. Besides, this study will help the semiconductor industries to be ready to accept the Internet of Things in improving their supply chain's process and performance. In addition, there are so many developed technology application that ready to be accepted by a company to be used as a tool in managing and ease the whole supply chain operation to become more efficient and effective. Technology application with Internet of Things (IoT) based are also developed with a lot of function and variety that can be accept according to company needs and financial resources in order to have smooth process and information flow while transforming raw materials into finished goods and delivering them to the consumer.

Next, this study also to identify the technology acceptance factors of using Internet of Things (IoT). From the result of it, researcher can identify the reasons on why there are some companies in the semiconductor industry resist to accept the use of Internet of Things in improving the supply chain performance. As a result from it, the related parties should involve in introducing the technology application in improving supply chain process among companies in this semiconductor industry. This research will discover and understand deeper on the scope and limitation that will be conduct in this study to ensure that this research are focusing on the right topic.

1.6 Scope and Limitation

The scope of this research is to identify the acceptance level of Internet of Things (IoT) in managing supply chain processes. Next, the purpose of this study is to identify the technology acceptance factors to use IoT. This research is conducted focusing on the semiconductor industries in Malaysia. There are two limitations were identified in this study.

First, this study is conducted in Malaysia and any companies in semiconductor industry. Second, is examining what are the acceptance level of these companies of semiconductor industry on the Internet of Things (IoT) and the technology application related. Next, this study is also identifying the factor influencing the semiconductor industries on accepting Internet of Things (IoT). In addition, time is also a limitation while conducting this study as the data need to be collected in the given period of time and must be analyze thoroughly to obtain the good result and conclusion. Next, the limitation is cost. This study aim to be conducted in Malaysia, so the data need to be collected effectively and cost to obtain it must be managed wisely.

1.7 Summary

This chapter is introduced and become a lead to next chapter in this study which includes background of study, problem statement, research question, and research objective, significance of study, scope and limitation. Based on this chapter as a platform, the researcher proceeds to the next chapter that is chapter two and focus to study on the literature review. In Chapter 2, the past research related to this study will be explained deeper and in details. In addition, it also will include the model used as a reference in this research. Based on Chapter 2, people will understand better on this study based on study from the previous research.

CHAPTER 2

LITERATURE REVIEW

2.1 Internet of Things (IoT)

The Internet of Things (IoT) is a network which builds up of mechanism that comes with sensors, computing and networking technologies which were combined together to produce an interconnected environment where the smart and technological devices are developing in effort to enhance the human lifestyle (Bello, 2017). Recently,IoT are developing rapidly in terms of applications, web and mobile (Samaniego., 2016). The areas that are now moving align with all these applications and interconnected data are transportation, industry, health care and others. (Samaniego, 2016). The management of diverse resources to gather data in IoT is the crucial parts which need more attention. (Samaniego, 2016).

Together with the fast phase of growing and interconnected information, the demand for internet-related products and services are quickly grow in Malaysia and also worldwide. (MDEC, 2016). In order to enhance the quality of human life and performance of operation such as logistics, transportation, health and management, IoT is being fully explored and developed in terms of ordinary application sector. All these new applications are continuously growing and contributing in various area of human life, as an example monitoring, controlling and automating the activities. (Bello et al., 2017). Areas of application and the interconnected devices within it are constantly grow and lead to the creation of additional value for both customers and business organization (Lee & Lee, 2015; Gartner, 2015; Manyika et al., 2015).