‘Saya/Kami* akui bahawa telah membaca karya ini dan pada pandangan saya/kami* karya ini adalah memadai dari segi skop dan kualiti untuk tujuan penganugerahan Ijazah Sarjana Muda Pengurusan Teknologi (Pengurusan Pemasaran)

Signature	:……....
Name of supervisor	:Dr. Norfaridatul Akmaliah Binti Othman
Date	:25th June 2014

Signature	:……
Name of Assessor	:……
Date	:……

A STUDY ON RELATIONSHIP BETWEEN UNIVERSITY-INDUSTRY COLLABORATION ON ECO-INNOVATION DEVELOPMENT

MUHAMMAD FARIZ BIN AHMAD

This final year project as partial fulfillment of requirement for degree of Bachelor of Technology Management in High-Tech Marketing with Honours

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DECLARATION

"I hereby declare that the work of this research project is produced by me for quotations summaries that have been duty acknowledged"

Signature :

Name : Muhammad Fariz Bin Ahmad

Date : 25th June 2014

DEDICATION

The research paper is lovingly dedicate to my respective parents who been my constant source of inspiration. They have given unconditional support with my studies. They did not give up describing support in my study. I say thank you to them. To all my family members, I would like to thank all of you for giving infinite faith in me to complete this research paper. Lastly to my supervisor, Dr. Norfaridatul Akmaliah Othman I say thank you for a lot of advice me for not to ever give up the grace of ALLAH and it will be my philosophy in my life.

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ABSTRACT

The eco-innovation was existed for a long time and Malaysia just was implemented that program in university and industry in Malaysia. A part of that, the collaboration between university-industry was implemented to gained new knowledge and developed technology about the eco-innovation development. This study focused on the relationship between university-industry collaboration and eco-innovation development. The objectives of this study were to explore the important of university-industry collaboration, to determine the relationship between university-industry collaboration with eco-innovation development and to identify the benefits of university-industry collaboration on eco-innovation in improving university-industry performance. In this research, a questionnaire was prepared and quantitative methods were used to collected responses from respondents answer and data were collected and analyzed. A total of 50 sets of questionnaires were distributed to the selected respondents to answer the questionnaire. The data collected were analyzed and the findings from the research show the university-industry collaboration on eco-innovation gave the benefits in improving university-industry performance. The research objectives will be achieved and the research question will be answer in this research.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter discusses about introduction of the study. It consists of background of the study, problem statement, research questions, research objective, scope of research, limitation of research and significant of the study. This introduction is important for research because this chapter is a beginning of iron triangle to achieving the objective of this research.

1.1. Background of Study

Collaboration is a joint effort of multiple individuals or work groups to accomplish a task or project (Margaret Rouse, 2013). A part of that, collaboration are a tools that are suppose to help you work together more effectively in order to achieve the end goal more quickly or deliver a better quality of product in the end or to solve the problem you could not have on your own.

In general, collaboration can be defined as cooperative arrangement in which two or more parties (which may or may not have any previous relationship) work jointly towards a common goal. Collaboration is an effective method of transferring 'know how' among individuals, therefore critical to creating and sustaining a competitive advantage. Collaboration is an important key of knowledge management. From a point of view, collaboration itself represents departure from the well-elaborated alternative modes of organization: market and hierarchy (i.e. the firm) in neo-classic economies.

Based on this point of view, many countries in the world take these opportunities to implementing collaboration between university and industry. In the R&D context, this option goes against the orthodox view that firms are better off if they organize R&D internally to avoid contractual difficulties in contracting out R&D and to safeguard competitive advantages (B.Bumside and L. Watkin, 2008). The ultimate objectives of each technology development research at universities are to influence (hopefully, positively) the way technology is deployed in industry. Therefore, universities and industry need to focus on the benefits each party can earn from collaboration.

Over the last twenty years, Asians governments have been giving increasing attention to the effectiveness of their national innovation systems, in particular the relationship between universities and industry. In spites of it's over helming success in the process of industrialization throughout the post-war period, Japan, by the late 1990s, was obliged to fundamentally transform its university industry relationship. In Japan, many good universities are traditionally state-owned and have thus been covered from the pressure of private sector. As a result, they have been shown little interest in working with business. Particularly after 1945, they harbored strong anti-business sentiment, believing that large business had been responsible from driving Japan into the painful Pacific War. Against this circumstance, it was rare for such state-owned universities to offer services to business in order to help them to resolve technical problem. Universities believed that they must be allowed to pursue authenticity, free from interest of external agencies such as government and

business. This belief in see-through independence coupled with the strong leftwing, anti-capitalist political atmosphere that exists among young students of the early post-war period made collaboration between university and industries something to be looked down upon, if not totally reject.

It was only late as late as the 1990s that Japanese people becoming serious about establishing mutually supportive relations between university and industry collaboration. The direct cause if this change was the heavy loss of competitiveness by Japanese firms to the United States in such keys sectors as information technology and biotechnology. China and the Korea countries that gain momentum in industrializing, were become new threats to Japanese industry. The response to these new challenges was to improve industrial structures and boost the competitiveness of Japan industry. Companies began to show increasing interest in utilizing the knowledge of universities rather than doing all of their research on their own. Under the pressure of global competition, utilizing the most advanced knowledge developed by universities in a speedy fashion became a matter of the highest priority for Japan. On the part of universities, there have been increasing indications that Japanese universities are failing behind foreign universities in their levels of academic research because they have not interested with industries, which employ equally competent scientist. At the same time, there is still a strong sense of alertness, often legitimate, that universities should not give way to the pressure to contribute to commercial gains at the expense of its academic and educational missions. Many Japanese universities are considering and reviewing their policies to find the suitable balance.

Meanwhile, China has emerged from a completely different historical background. Its university-industry collaboration have began as the early as the 1950s from the start of the Communist regime, universities were called upon to make full contributions towards the increase of production in China, as the Chinese economy was believed to be in a state of ‘shortage’. Transfer of knowledge from universities was conducted without explicit rules with respect intellectual property. It was only after the major policy change that role place during the 1980s that China

become more focused on the productivity of the economy and thus began to mobilize academic and scientific resources to achieve economic ends. The Decision on the Reform of Scientific and Technological Systems by the Central Committee of the Chinese Communist Party in 1985 marked this turning point in Chinese science and technology. This decision allowed universities to make their own decisions, based on the market situations in organizing R&D programs and transferring technologies. In addition the decision made it possible to provide incentives through "more pay for more work". The role of the government changed from direct intervention and control to guidance and oversight setting laws and regulations under which universities could decide on their own course of action.

Based on these situations above to increase the number of fundamental innovations and for the technological development, frequent collaboration and cooperation university-industry in Malaysia must be intensified. Usually university-industries collaboration are more involve in developing new process and to acquire new knowledge. The importance of university-industries research collaboration has risen steadily as a consequence of growing complexity, risk and cost of innovation.

The improvement in the relationship between science and technology, the integration of science and industry, the appearance of industries based on science, the use of science as a means to produce competitive advantages on the parts of the firms, as well as globalization of the economy and internalization of technology, are some of the reasons which justify the cooperative relationship strong collaboration between university and industries.

For the evaluation of university-industry collaboration and for the maturity of any nation's technology transfer are no doubt very important and a powerful means discussed practitioners as well as scholars (Agrawal, A, 2001). University research center is one of the most attractive external sources of technology for the industry, in an industrialized country; there exists a strong collaboration between university and industry to facilitate the exchange of technology (Agrawal, A, 2001).

Nowadays, many countries in the world aware about the important of eco-innovation development. So based on this situations collaboration between university-industry on eco-innovation development must be implemented. Eco-innovation is the introduction of any new or significantly improved product (good and service), process, organizational change or marketing solution that reduces the use of natural resources (including materials, energy, water and land) and decreases the release of harmful substances across the whole life-cycle. Eco-innovations that are geared towards reducing the amount of materials of energy used per unit output will result in lower material and energy cost.

This is an incentive for companies to eco-innovate or adopt eco-innovative processes. In a world of high prices of raw materials and energy, which are expected to remain on a high level particularly due to continuously high demand by emerging economies such as China (AIECE, 2009), resource productivity will be one key determinants for the competitiveness of European companies on international market (Bleischwitz et al.2009). However, as information deficits prevail, the payback periods are typically longer than many investor wish and other types of barrier exist, so that many companies, especially SMEs, do not make the needed investments.

Eco-innovation may also benefit companies by leading to new products and services, as well as by creating new markets in Europe and abroad. There seems to be considerable market opportunity for enterprises undertaking eco-innovation. Consumer demand for 'greener' products and product chains (for example certified products) is one driver creating new 12 markets. Increasing scarcity of certain resources may also drive the need for more efficient processes and technologies, thereby opening up markets. Finally, company image may benefit from eco-efficient processes, eco-innovative products and sustainable practices. The eco-innovation observatory will examine barriers, drivers and trends and generate guidance to support and motivate companies towards such investments.

However, the collaboration between university-industry with eco-innovation development in Malaysia still needs to be strengthening. Eco-innovation is the

development of products and processes that contribute to sustainable developments, applying the commercial application of knowledge to elicit direct or indirect ecological improvements. In a subsequent article, according to (Peter James, 1997) defines eco-innovation as a new products and processes which provide customer and business value but significantly decrease environmental impacts.

Based on this situation, university and industries must take these opportunities to do collaboration on eco-innovation development. The purpose to do this collaboration is to identify whether each party will get the benefits and consequently improving their performance. Since eco-innovation is still new in Malaysia it is important to university-industry collaboration to strengthen their collaboration for its own sake.

1.2. Problem Statement

Eco-innovation is any innovation that reduces the use of natural resources and decreases the release of harmful substances across the whole lifecycle. As all innovations, eco-innovation means bringing a new product (good or service) to the market or implementing a new solution in the production or organizational processes of a company. What distinguishes it from other innovations, however, is that eco-innovation results in both economic and environmental benefits. Environmental benefits include reducing the use of natural resources and decreasing the release of harmful substances per unit output across the whole life cycle. Natural resources include abiotic resources (e.g. minerals, metals), energy (e.g. energy carrying resources such as oil or gas), biotic resources (i.e. biomass), water as well as land. Eco-innovations result in improved resource productivity, lower GHG emissions and reduced waste generation.

The life cycle perspective means that eco-innovation is not simply about reducing input of resources into a single product, but about an overall better use of resources used to deliver certain utility or service. In some cases, it may even mean increasing input of resources in the production process if it is to substantially improve the utility and durability as well as to reduce resource use over the lifetime of the new solution.

However, there are many issues involve in eco-innovation development such as dealing with waste, monitoring and assessing waste, material and energy productivity and supply chains. Waste minimization is not just about reducing materials. It involves an examination of energy, emissions and effort needed to recycle or reuse the waste. When the full cost of waste is understood, initial waste reduction projects often show payback periods of less than one year. As raw material costs rise and the processing of recyclables expands, segregation of waste materials with acceptable levels of contamination may become economically viable and yield valuable income.

Global resource extraction and use increased by 78% between 1980 and 20085. This trend cannot continue without detrimental consequences for environment. The price volatility for commodities, notably metals, food and non-food agricultural items, was higher in the 2000s than in any decade of the 20th century6. The World Economic Forum (WEF) Global Risks Report 2012 ranked extreme volatility of commodity prices as the fifth most important risk in terms of potentially negative impacts7. At the same time, Europe is the world region most dependent on imports, especially for fossil fuels and metals. Many companies are exposed to risks of raw material supply shortages, price volatility and high material prices. But gathering market intelligence can be challenging for small companies. In order to identify “hot spots” for eco-innovation, knowledge on the challenges specific to the materials and energy used in their products is needed.

Meanwhile, supply chain management includes coordination and collaboration with suppliers, intermediaries, third party service providers and customers. Sustainable supply chain management requires the management of environmental, social and economic impacts—and the encouragement of good governance practices—throughout the life-cycle of goods and services. The key challenges related to supply chain management include coping with the rising volatility of commodity prices, dealing with uncertain supply of materials, as well as meeting customer demand for an improved transparency of supply chain. The most in-demand information includes data on the origin of resources used in products and evidence on the social and environmental impacts of resource use across the supply chain.

So to overcome the issues in eco-innovation development we must do the collaboration between university-industry. As we know, collaboration between university-industry are a tools that are suppose to help you work together more effectively in order to achieve the end goal more quickly or deliver a better quality of product in the end or to solve the problem you could not have on your own. By doing this collaboration industry can get knowledge or idea from university and consequently will overcome the issues on eco-innovation development.

This research aim is to explore the important of university-industry collaboration. Then this research will determine the relationship between university-industry collaboration on eco-innovation development. Lastly, this research will identify the benefits of university-industry collaboration on eco-innovation in improving industry performance.

1.3. Research Question

1) What are the purposes of university-industry collaboration?
2) Are they any relationship between university-industry collaboration and eco-innovation development?
3) Does university-industry collaboration on eco-innovation improve industry performance?

1.4. Research objectives

1) To explore the important of university-industry collaboration
2) To determine the relationship between university-industry collaboration with eco-innovation development
3) To identify the benefits of university-industry collaboration on eco-innovation in improving industry performance.

1.5. Scope of Study

In this study will give benefits on collaboration between university-industry collaboration eco-innovation developments. The selected respondents are from GreenTech Malaysia and Universiti Teknologi Malaysia (UTM) that involve effectively in collaboration between university-industry. There are 50 respondents from both of location involve in this survey. This scope also study about meaning of university-industry collaboration and eco-innovation development. This objective

will expand with the university-industry collaboration on eco-innovation development will improve the industry performance.

1.6. Limitation of Research

Due to the time limit of study, this research will only concentrate on one university and one industry. To be more specific, the university and industry are based in Malaysia. Because of our research is to determine the benefits of collaboration between university and industry on eco-innovation, the university-industry has been chosen because of its involvement with eco-innovation development and its potential in implementing the eco-innovation in the near future.

As the researcher also has monetary limitations, the research only conducts in Malaysia's university and industry. The fact that the result of this research, it may has some limitations to generalize to other university on an international level or any other industrial factors, thus it should be taken into due consideration

1.7. Significance of Study

This research is practical study that to seek out the benefits on collaboration between university and industry by identify the application of collaboration in several university and industry in worldwide especially in Malaysia. From this research, researcher came out with several results such as by doing collaboration; university and industry can take these opportunities for regional economic

development, with each partner contributing its individual strength to achieve a collective outcome.

Moreover, from this research, researcher determine the benefits that university-industry will get from the collaboration such as university provide basic research that is too costly or time consuming for industry. Next, industry can access to university expertise and skills and facilities; and government funding support for R&D. Besides, industry can recruit student that have talent during collaboration. For example, students handling project could be recruited by company upon graduating.

A part of that, industry can be as source of funding for university. For example, university can get the funds from government research grants or direct commissions from industry. In addition, university can access to industry facilities and industrial technical expertise consequently can improve knowledge of technology development and industry practices.

Furthermore, this research also observe the issues arise in eco-innovation such as dealing with waste, monitoring and assessing waste, material and energy productivity and supply chains. Based on this situation, researcher want to linked collaboration between university and industry with eco-innovation development. This research will explain how collaboration between university and industry will help to overcome issues on eco-innovation development. Successful in this study will raise the awareness of people about eco-innovation development and the important of collaboration between university and industry.

1.8. Summary

Collaboration is very important nowadays because by apply it some organization can get benefits from it and consequently improve their business

performance. For example, collaboration between university-industry gives benefits to both of organization. University needs sponsorship or fund from industry to develop or generate new idea to produce something while industry needs knowledge from university to improve their business performance. On the other hand, nowadays many countries in the world prefer to develop eco-innovation on their country. These situations occur because eco-innovation gives benefits towards development of their countries. However, in Malaysia no extreme collaboration applies between university-industry towards eco-innovation development. Hence, this research was conduct to see whether collaboration between university-industry on eco-innovation development can gives benefits towards both organizations performance.