UNIVERSITI TEKNIKAL MALAYSIA

MELAKA

STRUCTURAL EQUATION MODEL OF TECHNOLOGY INNOVATION MODEL USING AMOS FOR RESEARSHER OF FTK IN UTEM

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Mechanical Engineering Technology (Automotive) with Honors.

By

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I hereby, declared this report entitled STRUCTURAL EQUATION MODEL OF TECHNOLOGY INNOVATION MODEL USING AMOS FOR RESEARCHERS OF FTK IN UTEM is the results of my own research except as cited in references.

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Name :MUHAMMAD SYAFIQ BIN SULAIMAN

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APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Automotive) with Honours. The member of the supervisory is as follow:

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Date	:2.12.2019

ABSTRACT

Nowadays, many innovations have been made by researchers. However, their innovation may end up in a glass drawer. This is because, this is due to lack of commercial, lack of knowledge to attract / commercialize. Regularly, an academician confined with key performance indicator (KPI) or organization structure which is mandatory to do one researches per year with of budget limits or limited resources. Along these lines, utilizing advancement framework hypothesis as a column, this investigation looks at the connection between innovation capability (IC), innovation activity (IA), innovation performance (IP) and wider public sector for innovation (WPS) to Technology Innovation Model (TIM). Utilizing AMOS 22.0 programming auxiliary condition demonstrating (SEM) of TIM was finished by alluding to the overview led on 100 informational collection. It was investigated that SEM model qualities was gotten to approach perfect fit after constructing the model. This infers a portion of the factor may impact to the TIM.

ABSTRAK

Pada masa kini, banyak inovasi telah dibuat oleh penyelidik. Walau bagaimanapun, inovasi mereka mungkin berakhir dalam laci kaca. Ini kerana, ini disebabkan kekurangan komersil, kurang pengetahuan untuk menarik / mengkomersialkan. Secara kerap, seorang ahli akademik terkurung dengan penunjuk prestasi utama (KPI) atau struktur organisasi yang wajib melakukan satu penyelidikan setahun dengan batas anggaran atau sumber daya terbatas. Seiring dengan garis-garis ini, menggunakan hipotesis rangka kerja kemajuan sebagai lajur, siasatan ini melihat hubungan antara keupayaan inovasi (IC), aktiviti inovasi (IA), prestasi inovasi (IP) dan sektor awam untuk inovasi (WPS) kepada Model Inovasi Teknologi (TIM). Menggunakan AMOS 22.0 pengaturcaraan keadaan pembuktian (SEM) TIM telah selesai dengan merujuk kepada gambaran keseluruhan yang membawa kepada 100 koleksi maklumat. Ia telah disiasat bahawa kualiti model SEM_TI telah mendapat pendekatan sempurna selepas membina model. Ini merangkumi sebahagian daripada faktor yang mungkin memberi kesan kepada TIM.

DEDICATION

This work is dedicated to my beloved parents, Sulaiman Ishak and Siti Hajar Moon, my supervisor, Muhd Fariduddin Mukhtar, and my cherished friends whose always supports me during my studies.

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TABLE OF CONTENT

LIST OF FIGURES

LIST OF SYMBOLS

K	-	factor loading of every item
n	-	Number of items in model

LIST OF TABLES

Chapter 1

INTRODUCTION

1.0 Research Background

A technology innovation model (TIM) or referred as technology entrepreneurship is According to Drucker (1985), technology entrepreneurship is a process which has created new opportunities, while Mezias & Kuperman (2000), technology entrepreneurship is a lot of processes built on the basis of many efforts. Byers, Dorf & Nelson (2005) defines entrepreneurship technology as a process involving high potential identification, technology-based business opportunities and the collection of the necessary resources.

Entrepreneurship is likely similar as the concept of innovation, which it presented by the process itself must be valued; which consists of a method that recognized by others in the same industries, composed by a system which is have the novelty of newness. There are several models of the innovation process but the basic model used consists of seven different level which is Rothwell's innovation models, Abernathy-Utterback model, Stage-fates model, Van de Ven model, Chain-linked model, Spiral model and Triple helix model.

Research at UTeM is one of an educational institution's main branches. This is because research is important to enhance knowledge for students, the more knowledge on this subject, the more successful the research is. In addition, it can develop new

understanding related to learning and teaching when an educational institution conducts research. Educators benefit from different research as it helps them understand the subject better. In addition, he developed a greater understanding of other education's teaching, learning, and administration. This new knowledge can help improve the education of teachers and teachers. Researchers are therefore unable to run away from research.

1.1 Problem Statement

Nowadays, many innovations had been done by researchers. However, their innovation might end up in glass drawer. This is due to lack of commercial, lack of knowledge to attract/ commercialize. An academician often restricted with bureaucracy framework or key performance indicator (KPI) which is compulsory to do one researcher per year due to restricted funds and budget limits (Bloch, 2009; Bommert, 2010). Maximizing the welfare of society, security, politics, economy and the environment and ensuring the better quality of public services is an example of domestic and international challenge challenges that continue to suppress them to solve it (Hughes, Moore & Kataria, 2011a).

Based on Bloch (2013), an academician must deliver the best outcomes with few resources. Under the circumstance, the academicians must develop an innovation to guarantee the achievement in satisfying the nation and individuals' desires. Thus, it essential to support public sector innovation capabilities, framework conditions, activities, and performance. In order to advance the sector's innovation, general research on measuring sector innovation has to be done. This general research provided knowledge, understanding, analysis and the creation of new plans towards advancement and progression. Although knowledge to comprehend the performance of innovation in the public sector is insufficient, there are many innovation scenarios in the public sector (Bloch & Bugge, 2013; Hsieh,

2008). According to Bloch (2009), the studies of measures the public sector innovation is still in its early stages and the lack of quantitative evidence of accounts to limit to understand and promote public sector innovation (Arundel & Hollanders, 2011). By linking innovation performance with innovative capabilities, wider public sector conditions for innovation, and innovative activities, it will enrich the literature of this study.

This study attempts to examine the influence of innovation capabilities, wider public sector condition for innovation, innovation activity and innovation performance by applying innovation system theory. Bloch & Bugge (2013), Hughes, Moore & Kataria (2011a), and Arundel & Huber (2011) are examples of initiatives that have been adopted in various innovation studies to establish a link between innovation capabilities, wider public sector conditions for innovation, innovation activities and innovation performance. Though, their studies are more focused on the development of metrics for invention in the community area, and the impact of development is not a research objective. The performance of public sector innovation is viewed as an unreviewed research area despite the importance of the subject. (Gault, 2013; Mulgan & Albury, 2003).

1.2 Research Objective

I. To study several factors affecting technology innovation model to be implemented in FTK, UTeM.

II. To investigate researchers' opinion on TIM in FTK, UTeM.

III. To analyse the survey's results using SEM method.

1.3 Scope of research

This project will be focus on the lecturer in Fakulti Teknologi Kejuruteraan Mekanikal Pembuatan (FTKMP) and Fakulti Teknologi Kejuruteraan Elektrik Elektronik (FTKEE) in UTeM which consists of 220 people.

1.4 Significance of research

The findings of this study will benefit the management of Universiti Teknikal Malaysia Melaka (UTeM) in knowledge and progress towards the restructuring of the key performance indicators (KPI) framework. Other than that, this study will benefit and help management especially in the field of industry in guiding the entire process in to accomplish desired goals and objectives using available resources efficiently and effectively. Lastly for higher educational practitioner, this study will benefit them by stimulating the desire to explore other aspects of developing stronger knowledge.

Chapter 2

LITERATURE REVIEW

2.0 Introduction

This chapter will converse about the technology innovation and structural equation modelling using Amos. Innovation is about being creative and able to produce something new. This meaning refers to changing or renew an old product with new ones. This old product will keep continually updating and improving according to the developer. Innovation are basic to advancement of any civilization. New innovation creates new products that react to the wants and needs of the masses and invigorate higher standards for everyday life. Technology will act as a group of information may in this manner be viewed as a structure hinder for technology innovation.

Technology is the use of logical information for useful purposes like resolving problems or making life easier because it can act as tool to help people to adjust themselves with the current environment. Technology can help users to work smarter. It is a good opportunity to think or do things in an unexpected, better and faster way with fewer and more affordable problems.

Structural equation modelling (SEM) is an arithmetical study technique used to analyse structural relationships. This method is a fusion of element analysis and multiple

regression study, and it is utilized to evaluate the basic connections among controlled variable and latent construction.

2.1 Technology Innovation

Definition of technology innovation based on the sixth edition of OECD Frascati Manual is content new product and forms huge innovative changes of items and procedures. It can give different advantage that can improve the execution of an association. According to Oxford Wordpower Dictionary for Malaysian students, innovation is crucial to the continuing success of any organization. As the age, acknowledgment, and execution of new thoughts, procedures, items, or administrations (Thompson, 1965).

Technology have different meaning due to different theory from different perspective. Based on Patri (2011), technology have many ways to fulfil human needs and wants to adjust the condition to advance lives. Individuals have been growing new instruments and systems to protect from fancies of nature and to reduce the physical effort in accomplishing objective. Without any innovation advance, there will not have any improvement in any condition to lives. The term of technology is widely use. Therefore, there are no specific meaning to attached to it. Different individual has different perspectives or view about this. Technology is a bunch of tools that offered to help us improve surrounding. The term of technology is utilized while referring to the tremendous collection of artefacts which objects delivered by human effort that can be see, touch and feel. For example, Ellul (1964) state that technology as the totality of methods rationally arrived at and having absolute efficiency in every field of human activity. Thus, technology can have at least two different meaning which is the individual technical means themselves and the generalized study of individual technical process. McGinn, R.E. (1978) tell the characteristics of technology:

I. Technology is anxious with material as different to ideational results.

II. Technologist make artefacts rather than just aid something that is ordinarily done by nature.

III. Technology is resources-based and resources-expending.

IV. Technology is not accurately functional in science but knowledge of resources and methods, how to do certain things.

These characteristics of technology tell us that technology is relate to human requirement. According to Yunus (2009), technology is a systematic application of physical forces for production of good and services. It is the information, process, devices, strategies and frameworks utilized in the production of merchandise and in giving administrations. Technology is comprised of the hardware software and cerebrum product. The hardware is the physical structure and consistent design of gear and apparatus. The software is the information of utilizing the equipment to do the required undertakings and the cerebrum product is the explanation behind utilizing innovation with a certain goal in mind. All there relies upon the ability of the human component and the environment. Technology is the consequences of man learned and acquired.

2.2 Model of Innovation

2.2.1 Rothwell's Innovation Models

Roy Rothwell gives an insight into the history of the innovation process. It shows the process of innovation that changes from the linear model of '50s to '60s to multipart models of 80s' to 90s'. Based on Rothwell (1992) and Rothwell (1994) state that the innovation model records the relationship and flow of data between branches of an associated industrial association with customers. Rothwell points out the phase of development of economic reality and economic reasoning of the researcher by distinguishing five phases of the model of progress.

The first stage of the linear model is the "Linear Innovation Model" that has been used between '50s and' 60s. This model is represented by a "push technology" model. Technology innovation emerged in innovative efforts. This development process begins with a significant discovery or research that has been created. Unfortunately, it is abused by manufacturing and production activities and solves it by advertising and selling new imaginative goods or new "push" creative processes to market.

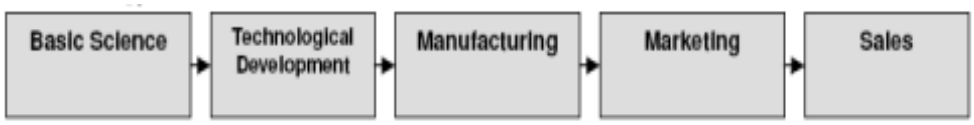

Figure 1 Model of Technology Push

The progress procedure consists of sequential, conceptual and fast progress, illustrated by the one-way links, without input. The second stage of linear model is the "market pull" which happened between the '60s and '70s. This model show that innovation come from apparent market need that effect admiration and rate of technology developments

and research and development (R&D) has a responsive job in the innovation development. In order to meet customer demand, the overall orientation of the innovation process should take effect.

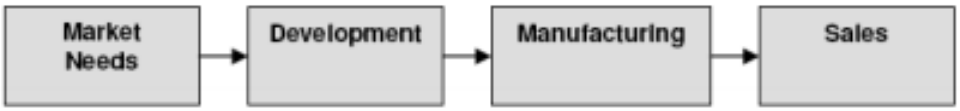

Figure 2 Model of Market Pull

The third stage of the linear model is a mix of "technology push" and "market pull" called the “coupling" process of innovation. This model focuses more on the process with emphasis on the effects of input between the market and the period of research of the linear model of the past. The "coupling" innovation process concurrently simultaneously, though the reality is inconsistent and it tends to be separated into practical interrelationships. This model suggests that providers and customers should be firmly “coupled” in an item improvement group.

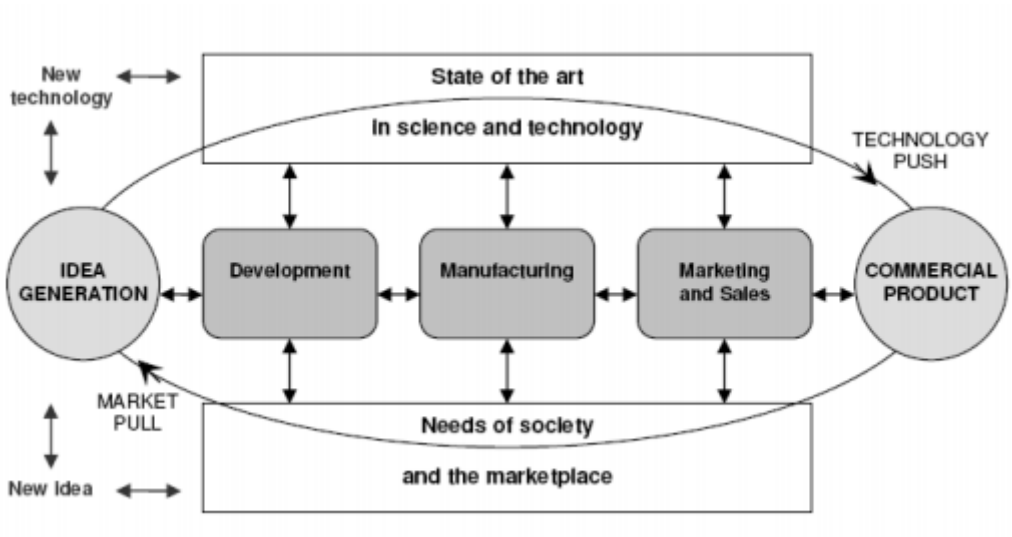

Figure 3 Model of Innovation Coupling

The fourth stage of linear model is called functionally integrated models of innovation processes and was created in the ’80s –’90s. The fourth stage is characterized by product integration and improvements at the same time but it is not in a successive way of admitting the division of the organization responsible for the plan and the progress of new items. (Galanakis, 2006)

The process of system integration and network innovation that occurred in the 1990s was the fifth stage of the linear model. The principle of the system demonstrates the impact of outer surrounding and functional transmission with the outer surrounding. Innovation happens inside the system of internal and external partners. Therefore, it is important to establish a relationship between all role players (Hamel, 2006).

2.2.2 Abernathy-Utterback Model

In this model of invention and process innovation, this is viewed as overwhelming product innovations in the beginning of the development process while process innovation is adaptable and firm try to increase upper hand by amplifying item execution (Utterback and Abernathy, 1975)The attention goes to various type of aggressive items and production chain becomes more energetic, with the arrangement of “island automation”.

Presently prevalent procedure advancement, need of expanding generation volume. In the third stage, the transcendent item developments and gradual procedure. This is because, the rivalry is centred around limiting expenses. The Abernathy-Utterback show is irrelevant in all industries but it is especially suitable for automotive, electronics, and mechanics. To understand how innovation activities are carried out there are many efforts to force some parties.