



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

RESEARCH ELEMENTS INVESTIGATION

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Process) (Hons.)

by

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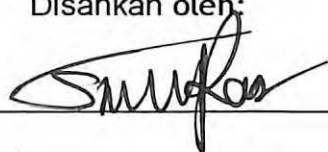
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I hereby, declared this report entitled “Research Elements Investigation” is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing process) (Hons.). The member of the supervisory is as follow:



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ABSTRAK

Penyelidikan adalah satu aktiviti yang sangat penting yang dilakukan di dalam universiti. Aktiviti ini merupakan salah satu fungsi utama sesebuah universiti selain daripada meningkatkan kualiti pendidikan, meningkatkan ilmu pengetahuan dan pembangunan serantau. Beberapa dekad yang lalu, kebanyakan penyelidik menghasilkan penyelidikan bertujuan untuk menghasilkan Harta Inteleks dan penerbitan sahaja. Pengetahuan saintifik yang dihasilkan oleh penyelidik tidak berkembang kerana tiada sumbangan terhadap inovasi dan komersial sebagai salah satu daripada hasil penyelidikan mereka. Kajian ini dijalankan adalah untuk mencapai objektif-objektif seperti berikut: untuk mengenalpasti kekurangan elemen yang menghalang penyelidik untuk menghasilkan penyelidikan yang berkualiti, untuk mengenalpasti kekangan yang menghalang penyelidik untuk menghasilkan penyelidikan yang terbaik, dan untuk mencadangkan satu model bagi membantu para penyelidik untuk menambah baik elemen-elemen dalam menghasilkan penyelidikan yang bermutu. Satu borang soal selidik telah direka berdasarkan elemen yang dikenalpasti semasa penyelidikan awal dengan menggunakan sistem matrik. Untuk kajian ini, kajian soal selidik dijalankan terhadap 100 orang responden daripada empat buah fakulti di dalam UTeM, iaitu Fakulti Kejuruteraan Pembuatan (FKP), Fakulti Kejuruteraan Mekanikal (FKM), Fakulti Kejuruteraan Elektrik (FKE), dan Fakulti Kejuruteraan Elektronik dan Kejuruteraan Komputer (FKEKK) sebagai sampel untuk kajian ini. Bagaimanapun, hanya 56% kadar maklum balas mengenai kajian ini dapat dicapai. Data soal selidik dikumpulkan dan dianalisis menggunakan 'Microsoft Excel Software'. Daripada kajian ini, empat elemen dikenalpasti iaitu niat utama penyelidik, masalah penyelidikan, rangkaian penyelidikan dan geran penyelidikan. Satu model telah dicadangkan bagi membantu para pengkaji meningkatkan elemen dalam hasil kajian ini.

ABSTRACT

Research is one of the crucial activity that can be conducted in university apart from traditional functions of university which is to enhance the quality of education, increase human knowledge and regional development. In the past few decades, most researchers produce research only to get their right for Intellectual Property (IP) and for publications. The scientific knowledge created by researcher is not expanded because no contributions towards innovation and commercialization as an output for the research. This study is conducted to fulfill these following objectives: (i) to identify the lacking elements that obstruct to produce good quality research, (ii) to identify the hurdles that obstruct researchers to produce worthy research and (iii) to propose a model to help researchers to improve the significant elements in conducting worthy research. Preliminary investigation is done to identify the current environment of conducting research in universities and research trends in universities. Questionnaires were designed based on the lacking elements that were identified using matrix method. For this study, survey was conducted with target of 100 researchers from four engineering faculties in UTeM which are Faculty of Manufacturing Engineering (FKP), Faculty of Mechanical Engineering (FKM), Faculty of Electrical Engineering (FKE), and Faculty of Electronics and Computer Engineering (FKEKK) as the sample in this study. However, only 56% response rate were gave the feedback of the questionnaires. The survey data was collected and analyzed using Microsoft Excel Software. Statistical method to identify the correlation between researchers' experience with research network and research grants with research performance. From the survey, four elements were identified that influenced the research outcomes which are primary intention of researchers, research problem, research network, and research grants. These elements are discussed to identify the hurdles that obstruct researchers to produce worthy research. A model was proposed as the outcome for this study to help researcher improve the lacking elements in conducting worthy research.

DEDICATION

To my beloved parents,
To my beloved supervisor,
To my beloved family,
To my beloved friends.

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I would like to thanks to my supervisor, Associate Professor Ir. Dr. Sivarao Subramonian for his patient and dedication to guide me from the beginning to complete this report.

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LIST OF ABBREVIATIONS AND SYMBOLS

FKE	-	Faculty of Electrical Engineering
FKEKK	-	Faculty of Electronics and Computer Engineering
FKM	-	Faculty of Mechanical Engineering
FKP	-	Faculty of Manufacturing Engineering
HDM	-	Hierarchical Decision Model
IP	-	Intellectual Property
USO	-	University Spin-off
UTeM	-	Universiti Teknikal Malaysia Melaka

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Over recent decades, the function of universities has evolved from their traditional concentrate on education and research to progressively active participation in regional development and improvement processes. Universities are also becoming important actors in regional innovation and commercialization systems, although their strategies and activities vary across institutions and regions. Research produces in university usually recognized as the core of nation's science and technology system since year 1970 (Atkinson and Blanpied, 2008).

Research is one of the process that has plainly defined parameters and has functions to discovery or creation of knowledge, or theory building; testing, confirmation, revision, refutation of knowledge and theory; and/or investigation of problem for local decision making (Hernon, 1991). Leedy and Ormrod (2001) put it as “the systematic process of collecting and analyzing information (data) in order to increase our understanding of the phenomenon about which we are concerned or interested”.

The good results of research are usually acted as the foundation of effective innovation and commercialization. Researchers that conducted a worthy research will give good impact towards knowledge transfer or technology transfer activities. These both activities are very important to achieve by research universities in order to generate income for universities. Knowledge transfer and technology transfer help to bring research results from the labs into innovation and commercialization application.

1.2 Problem Statement

Conducting research is one of the crucial activities that has been done in university apart from the traditional role of universities is to create knowledge and develop human capital through education and research. Over the past two decades, most of the researchers have strongly influenced by the 'scientific' paradigm on the academic cultural (McMillan et al., 2000). According to that paradigm, the sole purpose of academic research is to increase and enhance human knowledge, regardless of any practical application (Etzkowitz, 2008). McMillan et al. (2000) also pointed this paradigm has progressively contributed to a system of values that is deeply rooted in the academic culture and opposes the valorization of research through innovation and commercialization. Some of the researchers think that the function of universities as institutions devoted essentially to teaching and academic research may be weakened by the struggle to be innovation and commercialization such as entrepreneurial or market-relevant (Altbach, 2008).

Some scholars stated that the scientific knowledge or research results created by university research are not expanded because it not contributes to the innovation and commercialization as an output of research universities. Usually researchers only thought about intellectual property (IP) or publication as the final destination for their research results. Therefore, the scientific knowledge is not expanded and stopped at there (Adeyemi, 2007).

To expand the human knowledge created by research universities, the scientific knowledge or the research results generated by university researchers can contribute to the innovation and commercialization as an output of research activities. By these contributions, it shows that the research that is conducted by university researchers have their own value/quality and can be market. In addition, these knowledge transfer and technology transfer activities can generate profits to increase the university financial and enhance the quality of worthy research (Blasi, 2004).

Much effort has been spent by research community on investigating this problem. However, the field is still open to more research due to its early stage as opposed to other management fields. While other directions are as important and needed, this study is focused on identify the lacking elements that causes not achieve what should be in conducting research that will conducted by university researchers and propose a model to improve the research.

1.3 Objectives

This study embarks on the following objectives are to:

- i. Identify the lacking elements that obstruct researchers to produce good quality of research.
- ii. Identify the hurdles that obstruct researchers to produce worthy research.
- iii. Propose a model to help researcher improve the significant elements in conducting worthy research.

1.4 Scopes of Study

The general goal of this research is to develop a new model to improve the significant elements in conducting worthy research in university. This study approaches the problem by examining a comprehensive list of elements that are lack in conducting worthy research, and sees how the significant elements can help contribute to improve the achievement of the research university's mission. Due to the large amount of data that is collected and some uncontrollable challenges in accessing and obtaining those data from the journal, survey is conducted with target 100 respondents from four engineering faculties in UTeM which are Faculty of Manufacturing Engineering (FKP), Faculty of Mechanical Engineering (FKM), Faculty of Electrical Engineering (FKE), and Faculty of Electronics and Computer Engineering (FKEKK).

1.5 Structure of the Report

The report is organized into five chapters. Chapter 1 introduced the study which includes background of study, problem statement, objectives to be achieved throughout the study, scopes, as well as limitations of the project. In Chapter 2, Literature Review began with discussing several terms related to university, research universities, innovation and commercialization. For Chapter 3, methodology chapter discussed the methods employed upon completing the study. Methodology comprising quantitative approach is used to gather data. Chapter 4 is the results and discussion chapter which discusses about the analysis of the survey data and the data is interpreted into tables and graphs. Lastly Chapter 5 is discussed about the conclusion of this study and the recommendations should be conduct for further study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction to Research

2.1.1 Definition of Research

Research is careful and scientific inquiry into every subject, subject matter or area, which is an endeavor to discover valuable information which would be useful for further application (Creswell, 2005). Thus, research is a process of a systematic and in-depth study or research of any specific topic, subject or area investigation. Research may involve a scientific study or experimentation and result in discovery or invention, which would increase in scientific development or decision-making (Tracy, 2007). The research would result in the formulation of new theories, discovery of new techniques, an improvement in old concept or knocking-off of an existing theory, concept, method or technique. According to Creswell (2005) stated that research has three important steps: (i) generating ideas; (ii) research methodology; and (iii) data gathering.

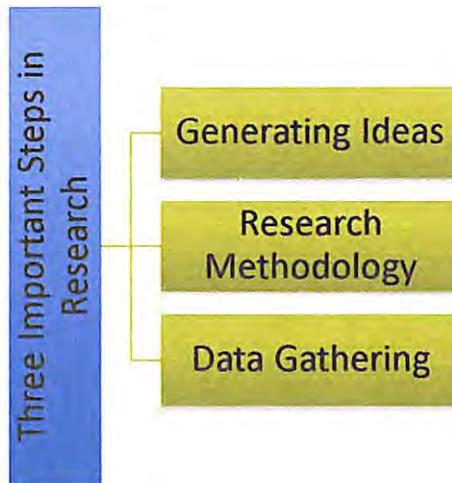


Figure 2.1: Three important steps in research (Source: Creswell, 2005).

2.1.1.1 Generating Ideas

The first step in the research process is to generate ideas. This process can be the most creative part. Even it sounds simplistic, but idea generation is one of the crucial steps toward answering the “right questions”. Before ideas can be generating, firstly, researchers must be identify the research problem. According to Kerlinger and Lee (2000), the identification of the research problem is the most difficult and important part of the whole research process. Research problem drives the research, the goals; research questions, review of the literature, methodology, results and conclusion. A well-structured, properly-reported study must provide answers to all questions regarding the what, why, when, how, where and who associated with the research. The problem statement offers the context necessary for addressing the why question (Tracy, 2007).

2.1.1.2 Research Methodology

A second important step in the research process is identifying the suitable research methodology to solve research problem. According to Leedy and Ormrod (2005) stated that usually novice researchers confuse between the research methodology and research tools. A research methodology is characterized as the general approach the researcher takes in carrying out the research project. On the other hand, research tool is defined as a specific mechanism or strategy the researchers use to collect, manipulate or interpret data. Research methods commonly used in information system studies includes: descriptive (case study), empirical /quantitative, qualitative, mixed methods (including both quantitative and qualitative), experimental, quasi-experimental, and simulations. Each type of research method encompasses many specific research tools that can be employed to address different research questions (Ellis et al., 2008).

In general, the methodology must be detailed and address the how, when where and who questions. The methodology outlines the types of research tools that the researchers will use to produce the study's results. The study results include the data, or the evidences, that can be used to answer the research questions. The results, in turn, permit the researcher to draw conclusions that are, in fact, the answers to the research questions.

2.1.1.3 Data Gathering

Data gathering is the process of collecting and measuring information on variables of interest to answer the stated research questions, test hypotheses, and evaluate outcomes. The aim for all gathering data is to capture quality evidence that then translates to data analysis and allows the building of a convincing and credible answer to question that have been posed. To maintain the integrity of research, it is essential to collect an accurate data (Tracy, 2007).

2.1.2 Types of Research

Research can be conducted using two types of research which are conducting new research or researchers can replicate the existing research. These types of research are commonly conducted by researchers to create scientific knowledge and enhance knowledge that can help to increase community and country development.

Replication is a term referring to the repetition of a research study, generally with different situations and different subjects, to determine if the basic findings of the original study can be generalized to other participants and circumstances. Replicating important research findings is essential for helping scientific research improve its usefulness to policymakers and practitioners (Burman et al., 2010).

Replication research is necessary for exploratory scientific required. A basic requirement for scientific integrity is the ability to replicate the results of research, and yet, with some occasional historical exceptions, replication has never been an important part of economic research. The researchers need to deeply justify which area they want to replicate from the previous studies because it can be clone if not clearly justify. According to Burman et al. (2010) envisions three kinds of replications:

- i. *Positive (or validating) replications*: These are studies where the replicating author shows the original article's findings are robust to substantial extensions over time, explanatory variables, and alternative estimation procedures.
- ii. *Negative replications (negative – Type I)*: These are studies where the replicating author is unable to reproduce the original article's results using the same data, the same specification, and the same area. In these cases, researcher should provide evidence that substantial efforts were made by the researcher to work with the original author to reproduce the original results.