DEVELOPING ASSESSMENT FRAMEWORK FOR INDUSTRY RESEARCH COLLABORATION AT UNIVERSITI TEKNOLOGI MALAYSIA

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A dissertation submitted in partial fulfillment of the

requirements for the award of degree of

Master of Management (Technology)

Faculty of Management and Human Resource

Universiti Teknologi Malaysia

OCTOBER 2011

DEDICATION

The results of this study are firstly dedicated to my dear parents;

To my father who supported me not just financially but also spiritually whenever I felt any deficiency in my life.

and

To my mother who has been as a source of warmth and affection during my whole life, energizing me upon I feel down and making me ready for continuing the way.

ACKNOWLEDGEMENT

First of all I am very thankful for my project supervisor, Dr. Aslan Amat Senin. I am very grateful for his patience, for reading my essays and offering valuable advice and helpful comments. I appreciate all my lecturers and the staff of Faculty of Management and Human Resource Development, University Technology Malaysia.

I offer my appreciation to all those respondents from Universiti Teknologi Malaysia, who kindly helped me and took part in my survey.

Lastly, I offer my regards and blessings to all of those who supported me in any respect during the completion of the project.

ABSTRACT

Knowledge transfer from university research to industry is an important part of the ecosystem of innovation that has great economic and social impacts. The purpose of this study was to develop evaluation framework for university-industry collaborative research and technological initiative at Universiti Teknologi Malaysia, by identifying the success criteria of university-industry collaborative research and technological initiative as perceived by academics. The research conducted in six faculties of Universiti Teknologi Malaysia. Results show that all of the respondents, whether have experience in research collaboration or not, had similar opinion about the importance of success criteria. In addition, all respondents whether had work experience in industry or not, had almost the same opinion about the importance of success criteria. Moreover the results show there was no significant difference between viewpoints of respondents from different faculties for success criteria. All of these similarities allow us to generalize this framework for all academic staffs regardless their experience in research collaboration activities, work experience in industry, and the field of research. As a consequence of this research project, an initial framework for continued development of an evaluation process has been established. Future research to refine the indicators and measurements of success criteria is needed.

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LIST OF ABBREVIATIONS

ACCT	Alliance for Commercialization of Canadian Technology
ATP	Advanced Technology Programme
AUTM	Association of University Technology Managers
CURDS	Centre for Urban and Regional Development Studies
DIUS	Department for Innovation, Universities and Skills
FBB	Faculty of Biosciences and Bioengineering
FChE	Faculty of Chemical Engineering
FKA	Faculty of Civil Engineering
FKE	Faculty of Electrical Engineering
FPPSM	Faculty of Management and Human Resource
FS	Faculty of Science
FSKSM	Faculty of Computer Science and Information System
HE-BCI	Higher Education- Business and Community Interaction
HEFCE	Higher Education Funding Council for England
IP	Intellectual Property
NIS	National Innovation System
OST	Observatoire des Sciences et des Technologies
PRO	Public Research Organizations
R&D	Research and Development
RCUK	Research Councils United Kingdom
RMC	Research Management Centre
S&T	Science and Technology
SFC	Scottish Funding Council
SPSS	Statistical Package for Social Scientists

TTO	Technology Transfer Office
U-I	University – Industry
UIRC	University Industry Research Collaboration
UTM	Universiti Teknologi Malaysia

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CHAPTER 1

INTRODUCTION

1.1 Research Background

As commonly agreed, universities are considered as a vital source of new knowledge for industry. This illustrates the university-industry partnership idea and concept is truly not something new. Relationships with university had been formed by Bayer, German pharmaceutical firm in late 19th century. The scientist in the research-oriented universities with industry player had been put together by National Research Council of the United States to support the war effort during World War I. Nevertheless, there are several reasons for both industry and universities to establish relationships with each other. A highly trained students, professors, facilities and new technologies in universities are available and reachable to the industrial firm with such relationship. Based on Fomhmn (1996), industrial firms might as well build up their reputation and image. Additional funds raise that normally for basic research were identified as the universities interaction with industry. This kind of relationship is acceptable since funding from industry is less bureaucratic red tape than from federal or state governments. In addition, The practice in problems, generate employment opportunities for university graduates as well as more accessible applied technological areas need to be exposed by students and faculty members of the universities (Frye, 1993).

Knowledge transfer from university research to industry is an important part of the ecosystem of innovation that has great economic and social impacts. In recent decades, the measuring the success of knowledge transfer mechanisms becomes an important issue for all sectors which involved in these activities. According to Sorensen and Chambers (2007), defining success in academic technology transfer is a function of defining what outcomes are desired, then tracking and measuring performance in light of those desired outcomes. Outcomes are a function of institutional mission. On the other hand, it is difficult to measure how successful universities exercise activities, such as transfer, especially because there is no agreement on frameworks. Different approaches to knowledge transfer measurement have been developed around the world.

One of the initial approaches was, the Survey of licenses, which is held annually by the Association of University Technology Managers (AUTM), gathers information about licensing the technology and information on the performance of U.S. academic institutions and Canada and non-profit for each year since 1991. In the UK, the approach to knowledge transfer measurement has been widened with the Higher Education-Business and Community Interaction (HE-BCI) Survey. This survey is managed by the Higher Education Funding Council for England (HEFCE) (Jongbloed, 2008).

According to Holi et al. (2008), in 2007 different associations, which had experience in measuring success of technology transfer activities around the world, sit together to design a general metric model. Library House, AUTM (US), UNICO (UK), the Alliance for Commercialization of Canadian Technology (ACCT) and a range of funders including Department for Innovation, Universities and Skills (DIUS), Research Councils UK (RCUK), the Scottish Funding Council (SFC) and the Higher Education Funding Council for England (HEFCE), participated in this project. UNICO commissioned Library House to undertake a project to define new metrics for the evaluation of knowledge transfer activities in universities.

In a professional area such as engineering, the symbiotic relationship between academics from institutes of higher learning, and their counterparts in industry, is essential. However, this relationship, especially in Malaysia, is still in its infancy stage (Abdul Rahim and Mohd Said, 2006). In Malaysia, the development of Research and Development (R&D), and concurrently, the fostering of the relationship between industry and universities are very closely tied to government policy. In recent years Malaysian government tried to support both universities and industries. During the Seventh Malaysia plan, the development of programs for R&D had the objective of broadening the Science and Technology(S&T) base. During the Eighth Malaysia Plan, three new schemes were introduced to enhance private sector R&D and in Ninth phase emphasis was on developing Malaysia's economy into high value added, high technology, and knowledge based economic activities in agriculture, manufacturing and services sectors. All these policies and activities require commitment and contribution from both academic institutions and industry, which need to work together to consolidate knowledge based economy in Malaysia.

1.2 Problem Statement

Knowledge has increasingly become recognized as a key source of economic growth and firms' competitiveness. With this trend, as universities are the source of new knowledge, the University–Industry (U-I) relationship has become an important issue.

Universities are increasingly playing an important role in developing technology and knowledge base, which underpins economic development process in many developed and developing countries. For decades, the involvement with the industry has

been increasing, and policy support from the government has been implemented to promote the University-Industry collaboration particularly in the form of joint research.

Universities are looking for new ways to remain relevant actors in the knowledge economy which means that they need to secure funding sufficient to cope with the huge costs of research. On the other hand, industrial firms are exploring ways of keeping abreast of technological progress in this highly uncertain competitive and rapidly changing environment. So the universities can consider as one of most important partner for industry. This partnership can form in different approach such as consultancy and technical service, cooperative R&D agreement, licensing, and contract research. An important point, which both universities and industry are concerning about, is success of the research collaboration. Defining success in academic technology transfer is a function of defining what outcomes are desired, then tracking and measuring performance in light of those desired outcomes. Outcomes are a function of institutional mission. To assess the success of industry-university research collaboration, determining indicators is essential. So for every mechanism, special indicators should define to finally design a framework to evaluate the success of industry-university research collaboration. As one of the leading universities in Malaysia, UTM has plenty of expertise and know-how, with numerous inventions and technologies being created from time to time. There are many opportunities for industry and businesses to work in partnership with the university, to further develop these inventions. So UTM is selected to conduct this research. Results of this research can be useful to enhance the quality of research collaboration activities in UTM. To conduct our research, we select six faculties from different field of research, which has the high portion of research activities in UTM (Research Management Center, 2010) and these faculties are from different field of research.

In this research we try to develop a performance evaluation framework for university- industry collaborative research and technological initiative at micro (organization) level based on the perception of academics. The research questions are:

- What are the success criteria of university industry collaborative research in UTM?
- Is there difference in viewpoint of people who had not participated in research collaboration and people who had participated in research collaboration about success criteria?
- Is there difference in viewpoint of people who had work experience in industry and people who had not any working experience in industry, about success criteria?
- Is there difference in viewpoint of respondents from different faculties, about importance of success criteria?

1.3 Research Objectives

This research is going to investigating university-industry relationship in Universiti Teknologi Malaysia to understand:

- Identify the success criteria of university-industry collaborative research and technological initiative as perceived by academics.

- Develop a performance evaluation framework for university-industry collaborative research and technological initiative at micro (organization) level.

In fact, the first research question leads us to achieve first objective of this research and the second, third, and forth research questions help us to achieve the second objective of research.

1.4 Research Hypotheses

Research hypotheses are as below:

H 1: There will be no difference between viewpoint of people who had not participated in research collaboration and people who had participated in research collaboration about success criteria.

H2: There will be no difference between viewpoint of people who had work experience in industry and people who had not any working experience in industry, about success criteria.

H 3: There will be no difference in viewpoint respondents from different faculties, about importance of Consultancy and Technical Services Provision success criteria.

H 4: There will be no difference in viewpoint respondents from different faculties, about importance of Cooperative R&D Agreement success criteria.

H 5: There will be no difference in viewpoint respondents from different faculties, about importance of licensing success criteria.

H 6: There will be no difference in viewpoint respondents from different faculties, about importance of Contract Research success criteria.

H 7: There will be no difference in viewpoint respondents from different faculties, about importance of Spin-off Companies success criteria.

1.5 Importance of Research

The importance of university-industry relationships can be identified in terms of benefits and advantages that are expected from collaborative activities. These benefits and advantages can be viewed from each beneficiary's perspectives. Determining indicators to assess university industry research collaboration (UIRC) can help universities and industries to get more benefits from research projects. Study's findings and conclusions will benefit universities especially in UTM and industries seeking to initiate, participate or manage research collaborations in the future.

1.6 Scope of Study

In this research, we will try to develop a performance evaluation framework for university-industry collaborative research at UTM. This study will be carried out from perspective of universities. The target population of this research is academic staffs in faculties of Civil Engineering (FKA), "Computer Science and Information System (FSKSM)", "Electrical Engineering (FKE)", "Chemical Engineering (FChE)", "Biosciences and Bioengineering (FBB)", and Faculty of Science (FS). These faculties have high portion of industry-university research collaboration activities in UTM

(Research Management Center, 2010). In addition, these faculties cover both engineering and non-engineering field of science. It is hoped, that the results of this study help UTM to measure the success of industrial collaboration from perspective of university. In addition, it can be useful to guide Research Management Center (RMC) and other departments, which are involved in research collaboration activities in UTM

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