



Faculty of Technology Management and Technopreneurship

**FACTORS INFLUENCING COLLABORATION BETWEEN
ACADEMIC RESEARCHERS AND INDUSTRY PRACTITIONERS
FOR COMMERCIALISING RESEARCH PRODUCT**

Syamimi Binti Md Zaini

Master Science of Technology Management

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RESEARCHERS AND INDUSTRY PRACTITIONER FOR COMMERCIALISING
RESEARCH PRODUCT**

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**A thesis submitted in fulfilment of the requirements for the degree of Master Science
of Technology Management**

Faculty of Technology Management and Technopreneurship

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2016

DECLARATION

I declare that this thesis entitled “Factors Influencing Collaboration between Academic Researchers and Industry Practitioners for Commercialising Research Product” is result on my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :

Name : SYAMIMI BINTI MD ZAINI

Date :

APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Master Science of Technology Management.

Signature :

Supervisor's Name : DR. NORAIN ISMAIL

Date :

DEDICATION

To the *noor* of my life, Md Zaini Zainal, Rashidah Jasin and also to the Muslim
worldwide.

ABSTRACT

In a competitive globalised world, research product commercialisation has been recognised as a new engine for wealth creation of a nation. Malaysia is not lagging behind in the mission of creating wealth and prosperities for the country. However, studies reveal that commercialisation of research product in Malaysia is still not at satisfactory level. One of the reasons is due to the weakness of collaboration between academic researchers and industry practitioners in commercialising research products. As such, this research aimed to investigate factors which influence a collaboration between academic researchers and industry practitioners in commercialising research products. For this purpose, a case study was employed within the context of the Malaysian Technical Universities (MTU) in order to gain an in depth understanding. As a case study requires multiple sources of data collection, a document analysis on Intellectual Property (IP) policies of MTU and interviews session with eight academic researchers and four industry practitioners have been conducted. The findings of this study yielded that four elements were needed in order to achieve collaboration between academic researchers and industry practitioners in commercialising research products; university, academic researcher, industry practitioner and research products. These elements are interdependent in which each role is crucial in complementing others in order to achieve high level of collaboration. The relationship between the elements were shaped by interdependence theory where they are required to promote each other's effort. If one element is missing, it would be difficult to achieve the collaboration. The findings were then developed into a framework. This study contributes to the literature by establishing the framework of the factors influencing collaboration between academic researchers and industry practitioners for research products commercialisation. Besides, this study also portrays a comparison of the perceptions from academic researchers and industry practitioners in discovering the real issues of collaboration and factors influencing them in achieving a collaboration in research products commercialisation endeavour. The findings of this study will be able to give valuable insights for academic researchers as well as industry practitioners to plan their strategies in commercialising research products. A series of recommendation were presented as well.

ABSTRAK

Dalam dunia global yang berdaya saing, pengkomersialan produk penyelidikan telah diiktiraf sebagai enjin baru bagi menjana kekayaan sesebuah negara. Malaysia tidak ketinggalan dalam misi untuk mewujudkan kekayaan dan kemakmuran kepada negara. Walau bagaimanapun, kajian mendapati pengkomersilan produk penyelidikan di Malaysia masih di tahap yang tidak memuaskan. Salah satu punca adalah kerana kelemahan kerjasama antara penyelidik akademik dan pengamal industri dalam mengkomersilkan produk penyelidikan. Lantaran itu, kajian ini bertujuan untuk mengkaji faktor yang mempengaruhi kerjasama antara penyelidik akademik dan pengamal industri dalam usaha mengkomersialkan produk penyelidikan. Oleh itu, satu kajian kes telah dilaksanakan di dalam konteks Universiti Teknikal Malaysia (MTU) untuk mendapatkan pemahaman yang mendalam mengenai topik yang sedang dikaji. Oleh kerana kajian kes memerlukan pelbagai sumber pengumpulan data, analisis dokumen keatas polisi Harta Intelek (IP) daripada MTU dan temu bual dengan lapan penyelidik akademik dan empat pengamal industri telah dijalankan. Hasil kajian ini mendapati bahawa terdapat empat unsur yang diperlukan dalam usaha mencapai kerjasama antara penyelidik akademik dan pengamal industri untuk mengkomersilkan produk penyelidikan. Unsur-unsur tersebut adalah universiti, penyelidik akademik, pengamal industri dan produk penyelidikan. Unsur-unsur ini saling bergantung dan memerlukan mereka untuk menaikkan usaha antara satu sama lain bagi mendapatkan kerjasama. Hubungan antara unsur-unsur yang telah dibentuk oleh teori saling bergantung di mana mereka dikehendaki untuk menggalakkan usaha masing-masing. Jika satu unsur hilang, ia akan menjadi sukar untuk mencapai kerjasama itu. Penemuan itu kemudian berkembang menjadi rangka kerja. Kajian ini menyumbang kepada kesusasteraan dengan mewujudkan rangka faktor yang mempengaruhi kerjasama antara penyelidik akademik dan pengamal industri bagi mengkomersialkan produk penyelidikan. Selain itu, kajian ini juga menggambarkan perbandingan antara persepsi daripada penyelidik akademik dan pengamal industri dalam mencari isu-isu sebenar kerjasama dan faktor yang mempengaruhi mereka dalam mencapai kerjasama dalam penyelidikan produk pengkomersilan diceburi. Hasil dapatan ini kemudian berkembang menjadi rangka kerja. Hasil kajian ini diharapkan dapat memberikan pandangan yang berharga bagi penyelidik akademik dan juga pengamal industri untuk merancang strategi mereka dalam mengkomersilkan produk penyelidikan. Satu siri cadangan dibentangkan pada akhir tesis ini.

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LIST OF ABBREVIATIONS

BD	-	Blu-ray Disc
BEM	-	Board of Engineer Malaysia
CIDB	-	Construction Industry Development Board Malaysia
CRIM	-	Centre for Research and Innovation Management
CSM	-	Concrete Society of Malaysia
E-CIP	-	Centre for Entrepreneurship Development, Commercialisation and Intellectual Property (IP) Management Research and Innovation Management
ICT	-	Engineering, Information Communication and Technology
IBS	-	Industrialised Building System
IEEE	-	Institute of Electrical and Electronics Engineers
IEEJ	-	IEEE Robotics and Automation Society, and the Institute of Electrical Engineers of Japan
IEM	-	Institute of Engineer Malaysia
I2I	-	Idea to Innovation

INSAT	-	Institute of Sustainable Agrotechnology
IP	-	Intellectual Property
IPC	-	Intellectual Property Committee
IPM	-	Intellectual Property Mobilisation
IPR	-	Intellectual Property Right
ITTHO	-	Institute Technology Tun Hussein Onn
KLRCAs	-	Kuala Lumpur Regional Centre for Arbitration
KUiTTTHO	-	Kolej Universiti Teknologi Tun Hussein Onn
KUKTEM	-	Kolej Universiti Kejuruteraan & Teknologi Malaysia
KUKUM	-	Kolej Universiti Kejuruteraan Utara Malaysia
KUTKM	-	Kolej Teknikal Malaysia Melaka
MDeC	-	Multimedia Development Corporation
MOSTI	-	Ministry of Science, Technology and Innovation
MTU	-	Malaysia Technical University
MTDC	-	Malaysian Technology Development Corporation
ORICC	-	Office for Research, Innovation, Commercialisation and Consultancy Management
PhD	-	Doctor of Philosophy
POP	-	Proof of Principle
R&D	-	Research and Development
SC	-	Steering Committee

TTO	-	Technology Transfer Office
UiTM	-	Universiti Teknologi Mara
UK	-	United Kingdom
UMP	-	Universiti Malaysia Pahang
UniMAP	-	Universiti Malaysia Perlis
USA	-	United States of America
UTeM	-	Universiti Teknikal Malaysia Melaka
UTHM	-	Universiti Tun Hussein Onn Malaysia
UTM	-	Universiti Teknologi Malaysia

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter introduces the background of the study, including the history of commercialisation research products and the needs for a collaboration between academic researcher and industry practitioner in facilitating the commercialisation of research products. Besides, this chapter also describes the purpose of study by listed out a few research questions and objectives to be achieved. Research scope, limitation and significance of study are also discussed to remain focus in achieving the aims and objectives. The organisation of the thesis is included as well.

1.1 Research Background

The trend of research products commercialisation has started since 1980s in the United States (US) (Boadu and Metla, 2008). The US has introduced the Bayh-Dole Act, to encourage the transfer of technology from university to industry. Bayh-Dole Act is an act which allows a university to own its inventions under federal grant (Siegel et al., 2003; Boadu and Metla, 2008). The legislation of Bayh-Dole Act has successfully brought university research products closer to industry practitioners who are seeking to commercialise university based technologies and also create a significant change in research and commercialisation (Siegel et al., 2003). Moreover, as a consequence from the Bayh-Dole Act legislation, many countries around the world has started to commercialise their

university's research products including Japan, Italy, South Korea, South Africa, Singapore, Philippines and also Malaysia.

In the aftermath of the legislation, universities are increasingly being recognised as one of the critical components in developing countries through knowledge based economy or also known as k-economy (Ramli et al, 2013). The commercialisation of research products from university serves as a new avenue for wealth creation of a country as it contributes largely to country's economic and development (Mohd Nor, Ismail and Sidek, 2015). Thus, many countries have taken initiatives to trigger the commercialisation of research product in their own ways. For example, in United States (US), the commercialisation of research product is very much focused on creating (economic) incentives for universities to commercialise their research output. Property right in US is awarded to the universities rather than academic researcher. This gives a strong incentives for universities to set up their own technology transfer offices which act as an instrumental in negotiating the appropriate mechanism for commercialisation (Goldfarb and Henrekson, 2003). In contrast to Sweden, the mechanism to facilitate the commercialisation of research product is directly created by government. Government establish university policy in order to facilitate the transfer of potentially valuable intellectual property.

On the other hand, many universities have also developed a "third mission" by fostering link with industry to encourage the commercialisation of research product and collaboration between university and industry (Rasmussen, Moen and Gulbrandsen, 2006). By complementing roles, collaboration of university and industry provides a strategic approach to the success of research product commercialisation as such collaboration contributes benefits to both parties (Ramli and Zainol, 2013; Perkmann et al., 2013). Instead of helping university to secure funding (D'Este and Perkmann, 2010; Othman, 2011), university can also produce products that meet industry requirements and industry can also

keep abreast with new technology innovation to maintain competitive measures with their rivals (Ramli and Zainol, 2013; Bodas Freitas, Marques and Silva, 2013). Therefore, Malaysian government has emphasised to strengthen industry and research collaboration under the Ninth and Tenth Malaysian Plan (2009-2015). Besides, in 2011, Knowledge Transfer Program (KTP) was introduced to broaden industry experience among faculty members (Salleh and Omar, 2013; Aziati, Hazana and Ping; 2014). Government also produced a book entitled “R&D Products of Universities in Malaysia 2013” to promote and introduce research product from universities in Malaysia to industry community and society. The book acts as a platform to encourage commercialisation of research product from universities. Moreover, to encourage the commercialisation of research products from university, various grants and research funding have been offered by the government such as Fundamental Research Grant Scheme (FRGS), Long Term Research Grant Scheme (LRGS), Exploratory Research Grant Scheme (ERGS) and Prototype Research Grant Scheme (PRGS), Transdisciplinary Research Grant Scheme (TRGS), Research Acculturation Grant Scheme (RAGS), Geran Sanjungan Penyelidik (GSP), and Niche Research Grant Scheme (NRGS). These funding are expected to increase and benefit research innovation and commercialisation of research product from university to the industry. With respect to the importance of research product commercialisation, it is essential to study what are the factors facilitates the collaboration between university (specifically academic researchers) and industry (industry practitioners) in the efforts towards commercialisation of research product.

1.2 Problem Statement

Research from university has been considered as a tool to achieve countries' income generation. However, studies reveal that research products commercialisation in Malaysia are still not at satisfactory level. One of the reasons is due to the weakness of collaboration between academic researchers and industry practitioners in commercialising research products. Many universities are swamped with research products but very few end with commercialisation. In addition, universities which are the centre of great minds and consist of experts in various field of specific knowledge are vaguely known to industry and not fully utilised for the betterment of the society.

This happens because establishing collaboration between university and industry is not an easy task. This type of collaboration is generally driven by different motivation, priorities and cultures. Most academic researchers prefer to deliver knowledge and publish their research results, whilst industry tends to keep the research findings secretly to avoid their rivals from gaining the information. Further, the conflicting understanding between the two parties makes it difficult for them to establish trust with each other. This weakness of collaboration makes the research products difficult to be commercialised. Thus, there is a need to develop a framework of the factors facilitate the collaboration between academic researcher and industry practitioner in commercialising research products.

Besides, studies that relate interdependence theory with commercialisation of research product are still scarce. Previous studies tend to treat the elements of the factors separately and individually; ignoring the fact that the interdependence between the factors can give a greater impact and result. Therefore, the framework of this study is guided and shaped by interdependence theory to show the relationship between the factors that emerge from the findings in this study.

Moreover, the collaboration between academic researchers and industry practitioners serve as a strategic approach which will benefit both parties to achieve their missions. This research is timely and consistent with the vision of the present Prime Minister of Malaysia, Dato Sri Najib Tun Abdul Razak that active collaboration between university and industry will have positive impacts on Malaysia. As such, this research aimed to achieve collaboration between academic researchers and industry practitioners by providing a framework of factors which influence collaboration between academic researchers and industry practitioners in commercialising research products.

1.3 Research Questions

Main Research Question: What are the factors influencing collaboration between academic researchers and industry practitioners in commercialising research products?

Research Questions:

- 1) What are the barriers to collaboration between academic researchers and industry practitioners in commercialising research products?
- 2) What are the factors influencing collaboration between academic researchers and industry practitioners to commercialise research product?
- 3) What is the framework for the factors influencing collaboration between academic researchers and industry practitioners in commercialising research product?

1.4 Research Objectives

The principle aim of this study was to investigate the factors influencing collaboration between academic researcher and industry practitioner in commercialising research product. The objectives of the study are as follows.

- 1) To identify the barriers of collaboration between academic researchers and industry practitioners in commercialising research product.
- 2) To analyse the factors influencing collaboration between academic researchers and industry practitioners in commercialising research product.
- 3) To propose a framework for factors influencing collaboration between academic researchers and industry practitioners in commercialising research products.

1.5 Research Scope and Limitation

The focus of this study is to investigate the factors influencing collaboration between academic researchers and industry practitioners in commercialising research products. This is achieved through analysing the barriers that hindering the collaboration and also the factors that influence the collaboration between academic researchers and industry practitioners in commercialising research products.

1.6 Significance of Study

As a developing country, Malaysia is striving to achieve 15% rate of commercialisation as one of the acts to achieve the status of a high income and developed nation as envisioned in Vision 2020 (BERNAMA, 2015). The Prime Minister, Datuk Seri Najib Tun Razak also announced in the budget 2016 to have 360 Research and Development (R&D) projects for commercialisation by the year 2020 (BERNAMA, 2015). The emphasis and urgency for commercialisation and innovation development in universities are also drawn under the Budget 2016 where Deputy Minister of Science, Technology and Innovation Datuk Dr Abu Bakar Mohamad Diah states that the government has reduced the proportion of government funding to universities as an act to trigger them to generate their own income through commercialisation of research products because universities were