

**PERCEIVED LEADERSHIP STYLES, ENTREPRENEURIAL
ORIENTATION AND COMMERCIALIZATION OF UNIVERSITY
RESEARCH**

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PERCEIVED LEADERSHIP STYLES, ENTREPRENEURIAL ORIENTATION
AND COMMERCIALIZATION OF UNIVERSITY RESEARCH

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To my God, Allah *'azza wa jalla*

Then to my beloved mother, lovely wife and son, all family members and my friends

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ABSTRACT

New leadership in higher education focuses on the development and integration of entrepreneurial activities within existing higher education systems. However, there is a lack of research on how leadership and entrepreneurial orientation can influence commercialization activities in higher education institutions in Malaysia. Using resource based view theory, this study investigated the perceived leadership styles and entrepreneurial orientation among academic researchers in commercialization of research. The study further investigated the moderating role of Technology Transfer Office (TTO) and mediating role of entrepreneurial orientation in the relationship between leadership styles and commercialization of academic research. A mixed method research design was applied to provide triangulation of data obtained from five Malaysian research universities. Data was collected through survey questionnaire from a sample of 223 academic staff and interviews with 12 faculty deans and TTO managers, in relation to leadership styles, entrepreneurial orientation, TTO and university research commercialization. The results of the study revealed a direct relationship of transformational and transactional leadership styles with commercialization of academic research. In addition, entrepreneurial orientation has significant influence on the commercialization of academic research. Besides that, TTO moderates the relationship between leadership, entrepreneurial orientation and commercialization. Entrepreneurial orientation significantly mediates the relationship between leadership styles and commercialization. Qualitative results verified the findings of the quantitative data. The findings of the research signify the importance of leadership and entrepreneurial orientation for enhancing commercialization of research in Malaysian research universities. Finally, this study suggests that future research can explore the concept of university commercialization in different context.

ABSTRAK

Kepimpinan baharu dalam pendidikan tinggi memberi tumpuan kepada pembangunan dan integrasi aktiviti keusahawanan dalam sistem pendidikan tinggi sedia ada. Walau bagaimanapun, terdapat kekurangan kajian bagaimana kepimpinan dan orientasi keusahawanan boleh mempengaruhi aktiviti pengkomersialan di institusi pengajian tinggi di Malaysia. Menggunakan teori pandangan berasaskan sumber, kajian ini mengkaji tanggapan gaya kepimpinan dan orientasi keusahawanan di kalangan penyelidik akademik dalam pengkomersialan penyelidikan. Kajian ini juga mengkaji peranan penyederhana Pejabat Pemindahan Teknologi (TTO) dan peranan pengantara orientasi keusahawanan dalam hubungan di antara gaya kepimpinan dan pengkomersialan penyelidikan akademik. Reka bentuk kaedah penyelidikan campuran telah digunakan untuk menyediakan triangulasi data yang diperolehi daripada lima universiti penyelidikan di Malaysia. Data dikumpul melalui soal selidik daripada sampel 223 kakitangan akademik dan temu bual dengan 12 dekan fakulti dan pengurus TTO, berhubung dengan gaya kepimpinan, orientasi keusahawanan, TTO dan pengkomersialan penyelidikan universiti. Keputusan kajian menunjukkan hubungan langsung gaya kepimpinan transformasi dan transaksi dengan pengkomersialan penyelidikan akademik. Sebagai tambahan, orientasi keusahawanan mempunyai pengaruh yang signifikan ke atas pengkomersialan penyelidikan akademik. Di samping itu, TTO menyederhanakan hubungan antara kepimpinan, orientasi keusahawanan dan pengkomersialan. Orientasi keusahawanan mengantara secara signifikan hubungan antara gaya kepimpinan dan pengkomersialan. Keputusan kualitatif mengesahkan penemuan data kuantitatif. Hasil kajian ini menunjukkan pentingnya kepimpinan dan orientasi keusahawanan bagi meningkatkan pengkomersialan penyelidikan di universiti penyelidikan di Malaysia. Akhirnya, kajian ini mencadangkan agar penyelidikan akan datang meneroka konsep pengkomersialan universiti dalam konteks yang berbeza.

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LIST OF ABBREVIATIONS

EO	-	Entrepreneurial Orientation
ELS	-	Entrepreneurial Leadership Style
Comm.	-	Commercialization
R&D	-	Research and Development
MIT	-	Massachusetts Institute of Technology
NRC	-	National Research Council
OECD	-	Organization for Economic Co- operation and Development
FTE	-	Full Time Equivalent
GII	-	Global Innovation Index
MOSTI	-	Malaysian Science and technology Indicators
MOHE	-	Ministry Of Higher Education
TTO	-	Technology Transfer Office
TLO	-	Technology License Office
IP	-	Intellectual property
AUTM	-	Association of University Technology Managers
NSF	-	National Science Foundation
RBV	-	Resource Based view
MLQ	-	Multifactor Leadership Questionnaire
SAQ	-	Self-administered questionnaire

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Universities have been the custodians of knowledge and technology for centuries. They are considered the hub of knowledge activity and are unique as they hold the key to inventions and innovations. These inventions and innovations are due to the skilled knowledge centres that reside in the form of faculty. Thus, faculty is the major source of all technological advancements that are attributed to the universities. The present study attempts to highlight the roles of academic leadership and academic researchers towards commercialization of research. Furthermore, the role of Technology Transfer Office towards commercialization is also explored and how it influences the academic researcher's orientation and academic leadership towards commercialization.

This chapter briefly highlights the background and the problem statement of the study. Further, research objectives and research questions along with the scope of the study have been discussed.

1.2 Background of the Study

From the past decade, universities are engaged in research and development activities for the betterment of the society and of championing commercialization and economic progression (Romero Martinez *et al.*, 2010; Ismail *et al.*, 2012). Researchers are also of the opinion that knowledge transfer by universities are potential source that can help generate revenues for the universities (Merrill and Mazza, 2010; Djokovic and Souitaris, 2008; Boehn and Hogan, 2012). Researchers have pointed out that universities engage in commercialization activities in a variety of forms such as engagement in business incubator activities or by involving themselves in commercialization activities such as technology licensing, patenting or university-based business consulting (Von Proff *et al.*, 2012; Merrill and Mazza, 2010; Sadao and Walsh, 2009; Ajagbe, 2014); start-up activities or the spin-off formations (Takahashi and Carraz, 2011; Juanola-Felis *et al.*, 2012; Jacobsson *et al.*, 2013; Ajagbe and Ismail, 2013). In fact commercialization of knowledge created in the universities have become the third mission of the universities besides teaching and research (Collier and Gray, 2010), mainly because researchers in the universities produce innovations as a result of their research activities which in turn can be exploited commercially (Ismail *et al.*, 2011; Autio 2007).

Chan *et al.* (2012) points out that the traditional academic viewpoint dictates universities to have sole focus of teaching, learning and research and not involve in commercial activities. This traditional academic thinking has continued for centuries mainly due to protection of the government (Buenstorf and Geissler, 2012; Berman, 2008; Bercovitz and Feldman, 2008; Ismail and Ajagbe, 2013). In the public protected environment there was no pressing need for universities to change their previous academic philosophies; hence there was reluctance on their part to enter into the marketplace (Kuratko, 2007; Browne, 2010; Ejermo *et al.*, 2011). The competitive higher education environment, where public and private sector universities strive for funding from both public and private sectors, as well as the government emphasis on universities to engage into research and development for knowledge and technology development has compelled these universities to venture

into entrepreneurial activities (Dahl and Sorenson, 2011; Kenny and Patton, 2012; Merrill and Mazza, 2010; Bianchi *et al.*, 2011).

Recent research has shown that the increasing global trend of entrepreneurial activities emerging in major academic institutions have left universities with no choice but to re-invent their operational activities and engage themselves in entrepreneurial activities to remain competitive globally (Elenurm and Alas, 2009). For universities, engaging in entrepreneurial activities indicate the pursuit of revenues not necessarily for profit, but for the continued commercial wellbeing of the university (Garcia-Villaverde *et al.*, 2010, 2012). Hence, innovation and commercialization has become an essential agenda for universities to survive in the competitive environment (Duening and Sherrill, 2005; Drucker, 2006).

Rauch *et al.* (2009) highlights that even though the field of entrepreneurship is relatively new to the university environment, commercialization of academic research depends on the university leadership and their support to encourage academic staff to commercialise their research (Chan *et al.*, 2012). Researchers are of the opinion that leadership behaviours are essential to determine the success of organizations, or even a nation as a whole (Arham and Muenjohn, 2012) and is of utmost importance in an academic setting (Bass and Riggio, 2006). In a competitive environment, organizations are supposed to be entrepreneurially oriented, to compete and survive and Leaders are required to build, inspire, further and uphold entrepreneurial orientation within the organizational setting which eventually enhances the overall performance and efficiency (Felgueira and Rodrigues, (2012) ; Arham *et al.*, 2011; Duening and Sherrill, 2005; Bercovitz and Feldmann, 2008; Berman, 2008). They posit that leadership can serve the process well simply by clarifying what is, and what is not expected of the subordinates. Some university administrators have been found to avoid commercialization even though they are aware of its benefits (Krueger *et al.*, 2008).

Arham and Muenjohn (2012) have described entrepreneurial orientation (EO) as entrepreneurship at the organizational level; although, it can also be viewed as the abilities of senior managers to take calculated risks, to be innovative, and to demonstrate proactiveness in their approach to strategic judgment. O'Shea *et al.* (2008) have highlighted that the entrepreneurial disposition and individual's abilities are important in shaping the individual's behaviour regarding commercialization. Audretsch and Erden (2004) exposed that only limited studies focussed on the cognitive and social-psychological processes associated with scientists reshaping their career paths and pursuing entrepreneurial paths. Similarly, Jain *et al.* (2009) have also highlighted the missing link that is the university scientist whose disposition towards entrepreneurial activity is the key to emergence of knowledge intensive fields. In the same vein, Meyers (2006) also suggest that there is a need to investigate the extent to which science, technology and entrepreneurial orientations are associated with different universities as it varies between universities and among academics.

The increased entrepreneurial activities engaged by the universities across the globe has mainly been attributed to the establishment of special support structures in the form of Technology Transfer Offices (TTO) and incubator centres (Meyers and Pruthi, 2011; Boh *et al.*, 2012; Goldfarb and Henrekson, 2003; Ismail *et al.*, 2012). Technology Transfer Offices have become critical in transferring research results to private companies in the form of licensed technologies (Ismail *et al.*, 2012; Collier and Gray, 2010) through its capable and expert staffing and reward systems (Boh *et al.*, 2012; Hughes *et al.*, 2010; Von Proff *et al.*, 2012; Grimaldi, *et al.*, 2011). The Technology Transfer Office is a structure that most entrepreneurially minded universities set up with the sole aim of finding suitable partners either for licensing or for spin-off formations (Ajagbe, 2014). The TTO have become the gatekeepers and boundary spanners in the technology transfer and commercialization activities undertaken by the research universities (Boh, *et al.*, 2012; Siegel, *et al.*, 2007).

The role leadership and Technology Transfer Offices play in the commercialization process cannot be underestimated. However, without the

entrepreneurial orientation of the academic researchers involved in research and development within universities, commercialization cannot materialize. Thus, the present study focuses on the Leadership and entrepreneurial orientation of academic researchers towards commercialization of research. Furthermore, the role of TTO as a facilitator of commercialization and as a link between academic researchers and industry has also been explored. However, the major focus is on the commercialization of research activities carried out by the academic staff and thus does not consider the traditional role of university teaching itself. There is a view that the Leadership is a new construct to understand the entrepreneurial activities of organizations. Thus, Leadership is put forwarded as a way of understanding the commercialization of academic research (Cassandra, 2010; Felgueira and Rodrigues, 2012).

1.3 Higher Education Institutions and Commercialization in Malaysia

Malaysia is a developing country ranked in the upper middle income group and is looking to join the high income bracket by 2020. The country is striving hard to attain this goal by enacting policies and measures that help in the overall economic development of the country. In this scenario, the role of higher education institutions has been highly emphasised. Globally, the importance of universities and their research & development and commercialization activities has been widely recognised (Drnevich and Kriauciunas, 2011; Aziz *et al.*, 2011) and there is an increasing shift towards the inclusion of commercialization activities in the university policies (Djokovic and Souitaris, 2008).

Commercialising university researches require three main strategies that are commonly applied; patenting or licensing, contract research, and the creation of university spinouts companies (Kroll and Liefner, 2008). The importance of academic research can be seen through spin-off creation as it involves direct

commercialization route (Hindle and Yencken, 2004). This assertion is yet to be the case in many developing countries such as Malaysia. Aziz *et al.* (2011) argues that a developing country like Malaysia is still behind in terms of its research capabilities. In fact, Malaysia has just entered the commercialization game very recently. This is evidenced by the fact that the Ministry of Higher Education's (MOHE) focus in terms of driving R&D activities among the universities had evolved from establishment of a research culture (2006 - 2008), to driving quality research (2008 – 2010), and most recently to promote research excellence through producing innovation and its commercialization (2011 – 2012) (Ajagbe, 2014).

Aziz *et al.* (2011) further reported that universities in Malaysia have been identified as among of the key factors for the growth and rapid development of the nation. This is reflected in the vast amount of investment of public funds into research activities among the universities by the government. This is actually a global trend that can be seen among both developed and developing countries across the globe. The investments made are in expectation of benefits that can be reaped by the researchers as well as enriching the growth of the country's economy. However, the trend has been that only small percentages of the R&D output by the universities in Malaysia do get commercialised (Ismail *et al.*, 2011; Ajagbe *et al.*, 2012).

Low (2011) highlights that Malaysia since its independence has gone through a number of transformations from agrarian economic society to production oriented economic society. Similarly, the higher education system of the country has also been transformed to support the economic transformations evident from the New Economic Policy of 1970s that continued until 1990. During this period, as highlighted by researchers (Low, 2011; Ling and Jaw, 2011), the education sector was given the utmost importance to provide the skilled human resources for the rapidly developing economy in Malaysia. During 1990s government focused on the liberalization of the education sector to transform the society into knowledge intensive society. The liberalization of the education sector was advantageous because it resulted in the production of knowledgeable graduates. Furthermore, with the introduction of the Universities and University Colleges (Amendment) Act 1996,

universities were given autonomy and were permitted to source external funding; establish commercial ventures, set up firms and take up shareholdings from quoted companies (Wong and Hamali, 2006) giving way for the development of much needed academia-industry linkage for the economic transformation (Low, 2011).

The government of Malaysia under its Tenth Malaysia Plan have emphasized upon the role of Malaysian universities in spearheading research and development with the aim of commercialising their research and development outcomes so that the country can move up the economic value chain ladder. Furthermore, commercialization of research and development outcomes has been set aside as the next engine of development. The seriousness of the Malaysian government as the Leaders in pursuing this intention is even more evident with the implementation of National Science and Technology Policy to promote the culture of science, innovation, and techno-entrepreneurship among Malaysians (MOSTI, 2010). The Second National Science and Technology Policy proposed to develop the much needed human resources in Science and Technology to become more competitive in terms of R&D and innovation. This is evident from the 21.8% growth in human resources involved in R&D in Malaysia (MOSTI, 2010).

However, the transformation from research and development into commercialization is a journey bedevilled with many challenges. The commercialization and innovation development has been assigned as Niche 1" by the Malaysian Ministry of Higher Education which implies the emphasis and urgency under the Tenth Malaysian Plan (MOHE, 2010; Aziz *et al.*, 2011). Subsequently, the universities have been allowed to source their own funding from externally motivated private sources. The acceptance of the importance of universities and their research, development and commercialization (R, D & C) activities has been widely recognised by the Malaysian government (Aziz *et al.*, 2011). Even with the government support for R, D & C for Malaysian universities, not all universities have been able to benefit and commercialise their R&D.

According to MOHE (2010) the twenty public sector universities have been involved in 2059 research and development projects, and have been able to commercialise only 125 (6%) whereas 442 (21%) projects have the potential to be commercialised. This shows the huge gap that exists between R&D activities and their subsequent commercialization. This can only happen if academia has entrepreneurial orientation as well as a proactive and entrepreneurially oriented leadership that can help and motivate the academics and researchers towards commercialization activity. Hence, the present study is an attempt to investigate how academic Leadership can enhance commercialization activity. Similarly, entrepreneurial orientation of academics leads them to be entrepreneurs. The present study further investigates whether academics and researchers have the entrepreneurial mindset and if so how they influence commercialization activity.

1.4 Problem Statement

Universities are increasingly viewed as a source for the creation and commercialization of new knowledge (Li *et al.*, 2008). As a result, there is a growing need for universities to become more entrepreneurial in terms of commercialization of research (O'Shea, 2005) and serve to local economic development (Etzkowitz, 2002). These developments are posing challenges to the traditional role of the university and its support practices towards entrepreneurial activities (Esley and Longenecker, 2006; Lerner, 2004). The importance of the traditional universities is well recognized in the literature (Bock, 2006). However, the new aspect of universities is still neglected. Thus it is required to study the entrepreneurial and commercialization role of the modern universities.

Bakar and Mahmood, (2014) indeed, recognize the need for universities to become entrepreneurial, which requires a change in approach to university leadership. Researchers agree that if universities are to be more entrepreneurial in

nature, they would need an entrepreneurial oriented strategy (Bergman, 2010; Litan and Mitchel, 2010). Cassandra (2010) suggest that for universities to be entrepreneurially oriented and excel in commercialization of research, proactive leadership is needed, which understands the situation and drive universities to better performance standards. Leadership ideology of entrepreneurship helps build the vision and then motivate followers to build the vision (Swank, 2010), a discovery of his inability to go it alone result in recruiting capable personnel and encouraging them to follow in his path (Hughes *et al.*, 2010; Phillips, 2012). There is increasing pressures from the governments on universities to engage in research & development activities and commercialization for economic and national development. Such activities require leadership attributes, dispositions and skills that are peculiar of entrepreneurs may be an important predictor of how extensively their universities embark on entrepreneurial activities (Garcia-Villaverde *et al.*, 2010). Previous studies accepted the role of leadership to enhance commercialization activities among universities (Cassandra, 2010; Krueger *et al.*, 2008). However, little attention has been paid to investigate the influence of different leadership style on commercialization activities and provided gaps for research in this area.

Litan and Mitchel (2010) while discussing the technology commercialization in US universities, highlights that the degree of an entrepreneurial orientation in public institutions like universities has not been investigated. Entrepreneurial orientation in universities may be reflected in the way leadership is viewed within the university by the faculty, in faculty performance reviews by considering faculty involvement in R&D activities leading to new inventions, or the means by which success is measured (Short *et al.*, 2010; Renko *et al.*, 2013). Kenny and Patton (2011) suggest that today's universities need to develop entrepreneurial skills and traits. Hence, there is a need for perception of the importance of the market in forming a new philosophy for the future of higher education with respects to traditional academic principles (Litan *et al.*, 2007; Kenny and Patton, 2011). However, the globalization of university education has resulted in the demand for a new type of administrative leadership with increased accountability as well as to produce commercialised technologies by public research institutions and universities (Litan *et al.*, 2007; Eurostat, 2012). To respond this global challenge Malaysian

government have announced some public universities as research intensive universities that should focus on the need to be flexible and act entrepreneurially (Ling and Jaw, 2011). Despite all the challenges faced by the public universities or even private universities, there is an increasing emphasis on the commercialization of university research, as creation of new technologies and innovations to drive economic growth (NRC 2010; Universities UK 2010; OECD 2010).

Kearney *et al.* (2008) suggest that entrepreneurship is the process that helps an organization to constantly innovate and effectively face challenges both internal as well as external to the organization. Universities recognise that engaging in entrepreneurial activities such commercialization could help them in generating funds as well as develop linkages with the industry that are much needed for successful transfer of knowledge (O'Shea *et al.*, 2008; Fini *et al.*, 2010). A few number of researchers have identified key initiatives implemented by universities towards enhancing their success rates in commercialising research outputs and creating spin offs (Short *et al.*, 2010; Kenny and Patton, 2011; Juanola-Felis *et al.*, 2012), such as technology incubators, science and technology parks, subsidy programs, entrepreneurship centres, creating specialised offices such as technology licensing office, commercialization office, incentive structures, royalty regimes, and equity investments. Even though, most of these studies have emanated from advanced countries and for developing countries like Malaysia, the process of innovation and commercialization is still fairly new (Ismail, *et al.*, 2013).

Ajagbe (2014) opine that the encouragement of commercialization of university research is a new phenomenon in Malaysia. The author added that the new phenomenon is evidenced by the fact that the MOHE's emphasised on driving R & D activities among the universities had evolved from the encouragement of a research culture (2006 - 2008), to driving quality research (2008 – 2010), and most recently to encourage research excellence through the generation of innovation and its commercialization (2011 – 2012). This requires university leaders to be proactive and visionary in nature (Muenjohn, 2010) for the purpose of building and sustaining the quality of the university and for providing flexibility in order to engage in

entrepreneurial activities (Cassandra, 2010). The reality is that many university leaders in Malaysia are still practicing traditional modes of management, having very little entrepreneurial vision to transform their institutions into the supposed centres of innovation (Yusof, 2009). As a result, universities are still facing issues relating to the ability to provide policy frameworks for commercialization and the industry have doubts about their attitudes towards change (Abdrazak and Saad, 2007).

Fini *et al.* (2010) points out that entrepreneurship is relatively new to the academic environment and not many researchers have investigated how leadership in Malaysian universities affects commercialization activities (Yusof, 2009). They suggest that if they are to take a more entrepreneurial approach, it will require university leaders who understand and possess entrepreneurial skills. Since it is accepted that successful technology commercialization begins with visible leadership, therefore, it is pertinent that leadership establishes clear vision and missions for technology commercialization (Felgueira and Rodrigues, 2013; Cassandra, 2010).

Previously, some studies have attempted to explore how, leadership, (Asmawi *et al.*, 2013; Gardner *et al.*, 1998; Shahmandi *et al.*, 2013) entrepreneurial orientation (Bakar and Mahmood, 2014; Rao, 2012) of academic staff influences the commercialization of university research. Effect of leadership on entrepreneurial orientation also well studied relationship (Duening and Sherrill, 2005; Weiss and Rupp, 2011; Dahl and Soenson, 2011; Elenurm, 2012; Shane *et al.*, 2010). Whilst research proved that entrepreneurial orientation is essential for commercialization (Tajudin *et al.*, 2014; Felgueira and Rodrigues, 2013; Krueger *et al.*, 2008; Todorovic *et al.*, 2011), thus literature provide a gap to study entrepreneurial orientation as a potential mediator between the leadership styles and commercialization of university research. Similarly, some studies also tried to investigate the role of Technology transfer (Ismail *et al.*, 2012; Von Proff *et al.*, 2012; Ajagbe, 2014; Siegel, *et al.*, 2007). Still the knowledge on how and what dimensions of leadership and entrepreneurial orientation influence the commercialization of university research is limited. Literature acknowledged the role technology transfer offices in the

commercialization of university research (Algieri *et al.*, 2011; Sellenthin, 2009; Siegel *et al.*, 2007; Carlsson and Fridh, 2002; Macho-Stadler and Perez-Castrillo, 2010; Heisey and Adelman, 2011). However the nature of this role still needs to be explored. Hoppe and Ozdenoren (2005) suggested studying TTO as moderator. Thus, study made an attempt to fill these gaps.

1.5 Research Objectives

The main purpose of this study is to help better understand the phenomenon of leadership, entrepreneurial orientation and their role towards university research commercialization. The objectives of this research are:

1. To find out the leadership styles (transformational, transactional and passive-avoidant) that influence commercialization in Malaysian Research Universities.
2. To examine the influence of entrepreneurial orientations (i.e. Proactiveness, Innovativeness, Risk Taking, Competitive Aggressiveness, and Autonomy) of academic researchers enhance commercialization in Malaysian Research Universities.
3. To study the relationship between leadership, entrepreneurial orientation, and commercialization activity in Malaysian Research Universities.
4. To determine the mediating role of entrepreneurial orientation between leadership styles and commercialization.
5. To examine the moderating influence of Technology Transfer Office on the relationship between leadership styles, entrepreneurial orientation and commercialization of university research.

1.6 Research Questions

To achieve the aforementioned objectives, the following research questions will guide the study:

1. Does leadership style (transformational, transactional and passive-avoidant) influence on the commercialization of university research?
2. Does entrepreneurial orientation (i.e. Proactiveness, Innovativeness, Risk Taking, Competitive Aggressiveness, and Autonomy) enhance commercialization of university research?
3. What is the relationship between leadership, entrepreneurial orientation, and commercialization activity?
4. What is the extent of mediation of entrepreneurial orientation on the relationship between leadership styles and commercialization?
5. What is the moderating influence of technology transfer office on the relationship between leadership styles, entrepreneurial orientation and commercialization of university research?

1.7 Scope of the Study

The study investigates the leadership styles, entrepreneurial orientation and the role of Technology Transfer Offices towards research commercialization using mix method approach. For the study, researcher focused on five Malaysian research universities which are; Universiti Teknologi Malaysia, Universiti Putra Malaysia, Universiti Sains Malaysia, Universiti Kebangsaan Malaysia and Universiti Malaya. Using mixed method approach, respondents for survey instrument and interviews were selected. The interview respondents were the Deans of faculties, Directors of TTOs and Academic researchers with commercialization experience. These respondents were interviewed in depth regarding the variables of the study and

researchers was cautious in not leading the interviewees but were asked general questions so that they could share their views and opinions freely. The interview sample consisted of 12 respondents. Secondly, survey instrument was used to record the perceptions of the academic researchers. The academic researchers for survey belonged to science and engineering faculties. Cautious approach in collecting survey data and interviews was adopted to minimize the biasness during the process of presenting the findings of this research.

1.8 Significance of the Study

Study intended to investigate the role of leadership and entrepreneurial orientation toward academic commercialization. The researcher in this study is attempting to fill this gap by seeking to answer the main question which is what type of leadership influences commercialization activity successfully? The study explored new knowledge in the fields of leadership and entrepreneurship, especially in the context of developing countries like Malaysia. In view of the current environment, universities increasingly strategizing the commercialization of the university research as alternative for the development and expansions of their operations rather than focusing only on teaching and research (Ismail, *et al.*, 2013). Thus, study provides insights how universities can enhance their commercialization activities. Study significantly contributes to the body of knowledge across national economies. Study argues that more emphasis to be placed on transferring and commercializing knowledge generated within universities. More specifically, there is a growing need for universities to disseminate the knowledge generated beyond the narrow confines of the academic community itself through commercialization of their research output. As a result, many universities are now playing a role in society through actively converting new scientific discoveries into commercialization opportunities (Leitch and Harrison, 2005). Thus, study provides a significant contribution to understand commercialization of research activities among universities.

The researchers have highlighted that there is a need of leadership that focuses on entrepreneurial orientation for the universities (Cassandra, 2010; Krueger, *et al.*, 2008) to expedite the process of commercialization in the universities. So there is a need for studies to identify the role of leadership in enhancing entrepreneurial oriented for the universities (Yusof, 2009). The literature also highlights that there is a need of investigation into entrepreneurial behaviour of the academic researchers as very few studies have been conducted on the individual researchers (O'Shea, *et al.*, 2008; Aziz, *et al.* 2013). Thus to fill the gap highlighted by the researchers, present study focused on the individual academic researcher to find out the orientation of these individuals towards commercialization. Thus, the present study responded to the calls of various researchers and took to address the gaps related to the Leadership in universities especially focusing on Malaysian research universities.

1.9 Operational Definitions

The following terms have been used in the study.

Commercialization: In the present study, academic commercialization is taken as *a knowledge and technology transfer between university and industry which can take the form of patents, licensing, spin-off creation, consultancy, publication, joint collaborations that are beneficial for the growth of economy and the development of society.* Yaacob, *et al.* (2011)

Technology Transfer Office: Specialised offices established within the structure of universities to facilitate academic researchers by engineering synergistic networks between academics and industry, provide human and financial resources that are necessary for technology transfer, and provide expertise in evaluating markets, writing business plans, raising capital, assembling teams and obtaining space and equipment. Carlsson and Fridh (2002)

Leadership Style: Bass and Riggio (2006) described a leadership continuum with three wide leadership classifications; transformational, transactional, and laissez faire. Transformational leadership is a follower oriented leadership method. Transactional leadership is a task focused labour exchange structure of leadership (Arham and Muenjohn, 2012), whereas, Laissez faire leadership is an absence of leadership (Bass and Riggio, 2006).

Entrepreneurial Orientation: Entrepreneurial orientation is the cognitive and socio-psychological processes of individual scientists to engage in entrepreneurial activity in creation of new knowledge (Audretsch and Erden, 2004; Jain *et al.*, 2009).

1.10 Research Process

The research process indicates the flow chart of the processes followed. The study used background as a base for formulating the problem statement that led to the formulation of the research objectives and research questions. This was followed by a detailed review of literature leading to the theoretical model of the study. After review of literatures, methodology was devised that was followed in the study. Data were collected and results interpreted and discussion was generated on the basis of the results of the study. Finally recommendations were made. The research process is illustrated in Figure 1.1.

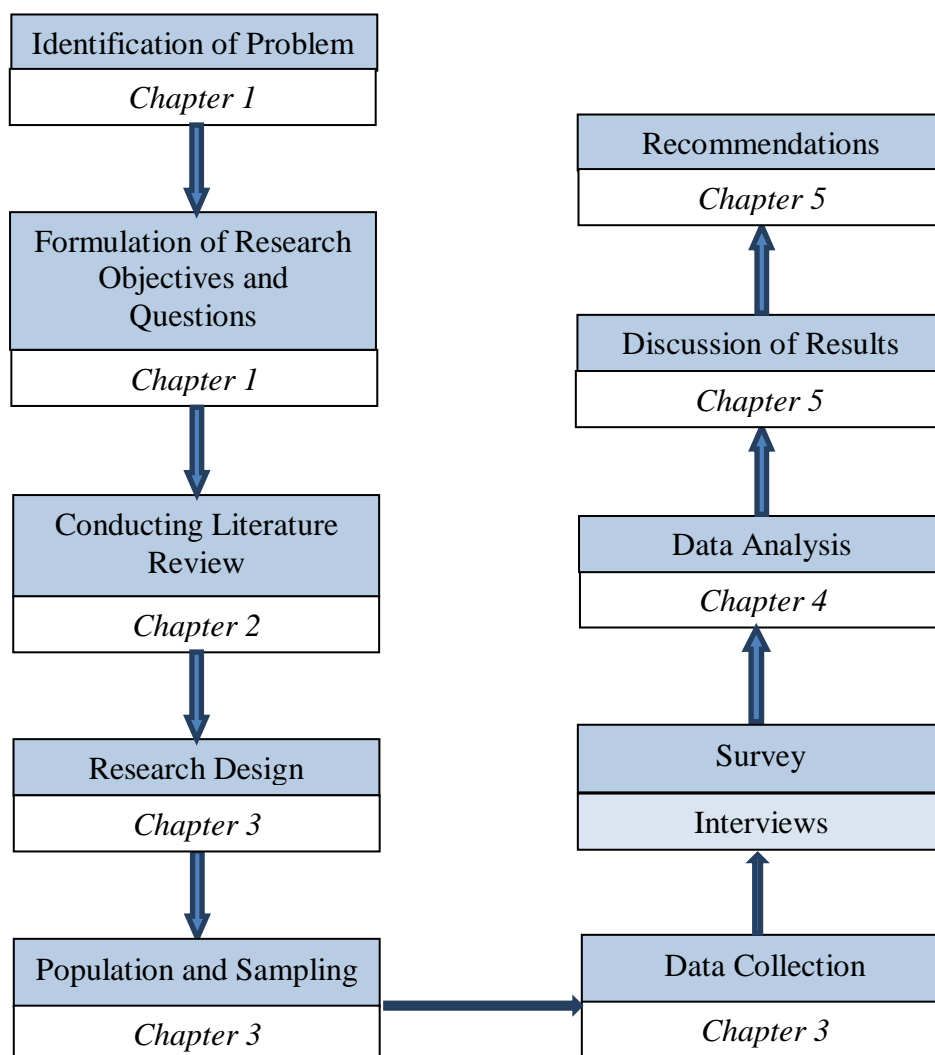


Figure 1.1 Thesis Flow Chart

1.11 Outline of the Thesis

The present study is divided into five chapters. These chapters have been highlighted in the research process as illustrated in section 1.9. The brief description of each chapter follows as below.

Chapter 1 highlights the background of the study that formed the basis for the problem statement. Research questions were formulated to achieve the objectives of the study. The chapter also highlighted the scope of the study.

Chapter 2 reviews the previous literature related to the variables of the study. The chapter also discusses the theoretical framework that forms the foundation of the research. Finally research model of the study is also presented.

Chapter 3 describes the methodology adopted in the study. The chapter also highlights sub-models of the main model to show the relationships along with the formulated hypotheses. The chapter further discusses the population and sampling procedures along with the data analysis techniques adopted in the study.

Chapter 4 provides the results and their interpretations. The analysis has been carried out for both quantitative survey data and the qualitative interviews data using content analysis approach. Moderator and mediator analysis has been carried out using Baron and Kenny (1986) method.

Chapter 5 summarizes the research results and provides discussion based on previous researches. The chapter also provides contributions and implications of the study. The chapter ends with recommendations for the future researchers.

1.12 Chapter Summary

This study aimed to investigate leadership styles and entrepreneurial orientation of academic researchers towards the commercialization of university

research. By exploring the phenomenon of leadership and orientation within university context, the study aimed to broaden the knowledge regarding the academic leadership styles and entrepreneurial orientation of academic researchers towards research commercialization activity in Malaysian Universities. The present chapter has highlighted the background of the study which formed the basis for the problem statement, research objectives and research questions. Finally the research process followed in the study has been illustrated.

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