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ENTREPRENEURIAL UNIVERSITY IN THAILAND

**A CASE STUDY OF
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Abstract

The purpose of this research is to investigate the existence of entrepreneurial university in Thailand and to examine the dynamics of the pathway towards entrepreneurial university of King Mongkut's University of Technology Thonburi (KMUTT). This research has been done by analyzing five entrepreneurial university elements of KMUTT by using a theoretical framework developed by Burton Clark. The research draws upon mostly primary source: semi-structured interviews with KMUTT university administrators and academics. Document analysis is also used as secondary source to enhance research validity. Upon examination of the five elements, it becomes clear that entrepreneurial university exists in Thai higher education to some extent and the entrepreneurial university concepts have been instilled in KMUTT. One of Clark's elements of entrepreneurial university the "diversified funding base" exists strongly within KMUTT and it is likely to be even greater in the future. The "strengthened steering core" is still in its transitional phase. Other elements, including the "extended periphery", "academic heartland" and "integrated entrepreneurial culture" are in the early stage of KMUTT's transformation into an entrepreneurial university. This research discovers that the term entrepreneurial university is still new in Thai higher education. Ineffective internal communication, state regulations and existing bureaucratic mindset among university administrative and academic units cause some difficulties for the university to bring changes or new values in its administrative and academic departments. This research introduces KMUTT and a clear definition of entrepreneurial university to Thai higher education research community. Moreover, the research highlights the importance of entrepreneurial university in enhancing university industry linkages, supporting Thai national policies as well as showing how a research university survives the insufficient state funding and become more self-reliant.

Keywords: entrepreneurial university, KMUTT, Thailand, research university

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Abbreviations

GDP	Gross Domestic Product
IPST	The Promotion of Teaching Science and Technology
KMUTT	King Mongkut’s University of Technology Thonburi
MOU	Memorandum of Understanding
NIEs	Newly Industrializing Economies
NPM	New Public Management
NRCT	National Research Council of Thailand
OHEC	Office of Higher Education Commission
ONESQA	Office for National Education Standards and Quality Assessment
QA	Quality Assurance
R&D	Research and Development
RIPO	Research, Innovation and Partnerships Office
SMEs	Medium-Sized Enterprises
STI	Science, Technology and Innovation

Chapter 1 Introduction

1.1 Background

Entrepreneurial university is a type of university which is discussed widely in western countries about its transformed ability to survive changes such as the decrease in state funding and become more self-reliant. Many forefront universities such as Stanford University in the United States, University of Warwick in England, University of Strathclyde in Scotland and University of Twente in the Netherlands are described as an entrepreneurial university (Clark, 2004b). The transformation to be an entrepreneurial university is stimulated by the increasing pressures such as the demands for more specialized graduates, employability, the uncontrollable growth of knowledge, the decrease in state support and the more interest groups in university's activities (Clark, 1998b). Some universities' behaviors such as active seeking for more sources of funding and creating linkages with external organizations are considered as entrepreneurial (Clark, 1998a, 2004a, 2004b, 2015). Such attempt of a university to actively build up capacity for better response to the growing demands exists in Thai higher education. Public funding shortage has incentivized Thai public universities to seek for other sources of income (Intarakumnerd & Schiller, 2009). A number of public research universities in Thailand have been granted autonomy and depended less on government budget, which finally led them to become more entrepreneurial and operate their activities and research that are relevant to industry (Intarakumnerd & Schiller, 2009). The previously mentioned transformation of universities is coherent with the context of entrepreneurial university suggested by Burton Clark that the emergence of knowledge based economy and society forces universities to provide competent graduates to the labor market and depend less on public budget (Clark, 1998a). Some Thai research universities such as King Mongkut's University of Technology Thonburi (KMUTT), Mahidol university and Chulalongkorn University were claimed to be operated as entrepreneurial universities (Savetpanuvong & Pankasem, 2014; Yamsri, 2016). However, the entrepreneurial university elements have not been analyzed to great extent in prior empirical studies.

1.2 Research Problems

The concept of entrepreneurial university is likely to attract lots of attention from Thai policy makers since it has been introduced and accepted in the modern world. It is also seen as a type of university which encompasses and extends the concept of the research university (Etzkowitz, 2013). However, Thai higher education institutions have considered the culture of borrowing ideas and policies from western countries as a country's modernization process (Sae-Lao, 2013). This raises the author's concern about the fitness of entrepreneurial university concept to the context of Thai higher education and the success of its implementation at institution level. Entrepreneurial university should not be only a buzzword to justify the modern movements of a university. A successful entrepreneurial university requires strong practices, the understanding of the concept as well as grounded and widely accepted belief of the model among university stakeholders (Clark, 2004b). Therefore, the author is eager to contribute to the field of Thai higher education by finding out the current state of entrepreneurial university in Thai higher education and analyzing the dynamics of the pathway towards entrepreneurial university. In this study, KMUTT is chosen as a case study for two main reasons. First, KMUTT has been the only university which is mentioned in science technology and innovation policy report of UNCTAD as a good example of Thai universities with industrial linkages and various sources of income (UNCTAD, 2015). The various funding channels and the collaborations with external organizations are coherent with some entrepreneurial university elements in its university's behaviors such as "the diversified funding bases" and "the extended periphery" provided by Burton Clark (Clark, 1998a; KMUTT, 2017). Apart from Clark's concepts, KMUTT mission also covers some of the ideas of the first phrase of entrepreneurial university model or "entrepreneurial university one" stated by Etzkowitz that the university is able to determine its strategies and gain its income through different funding channels (Etzkowitz, 2013; KMUTT, 2017). Second, there is no existing empirical study about KMUTT even though the university stands among nine Thai notable research universities. Therefore, the author aims to contribute to Thai higher education by conducting research about KMUTT. This study aims to answer the research question "how has KMUTT been operated as entrepreneurial university?"

1.3 Research Gap

The author aims to fulfil the knowledge pool of Thai higher education research by choosing research topic which is related to the current operating trends of universities in Thailand. The author searched existing research related to “entrepreneurial university in Thailand” online as well as from some Thai universities’ library databases. The result was that the documents and research related to KMUTT entrepreneurship is scarce and mostly conducted in Thai. Most of the existing research in Thai higher education is about Thailand’s obstacles in promoting university-industry linkages. Although a comparative research about research university with a case of Chulalongkorn University (CU) has been done by a Thai scholar Rungfamai (2011), the research reveals the university stakeholders’ perception of research universities in Thailand, with special attention to governance. The researcher mentioned about the entrepreneurship of the university but did not use it as the theme of the research (Rungfamai, 2011). Moreover, there is no research directly conducted about entrepreneurial university and KMUTT in Thailand. This leaves the gap for the author to fulfill and work on research question “How has KMUTT been operated as entrepreneurial university?” Nonetheless, the author is aware that there might be undiscovered channels or sources for existing research about entrepreneurial university. Therefore, the author put more effort into ensuring that the research will be unique, conducted well and meaningful to the field of higher education as much as possible.

1.4 Research Methodology

This study uses qualitative methods to explore and understand KMUTT entrepreneurial university spirit. According to Creswell (2013), “to explore and understand the meaning of individuals or groups ascribe to a social or human problem, qualitative research can be chosen as an approach.” (Creswell, 2013). This method focuses on informants’ perceptions and experiences. The goal of conducting of research is not to understand only one idea but multiple realities (Creswell, 2013). Therefore, to get the most updated information and to explore all possible issues related to the research topic, the author interviews twelve KMUTT staff including KMUTT university policy makers and academics. In this research, KMUTT is chosen as a case study of Thai research public university. The case study institution has some of its activities such as receiving income from many financial sources and having strong linkages with external organizations which can be considered as entrepreneurial university activities. Case study as

defined by Creswell (2014), mainly used in evaluation field and should be developed an in-depth analysis of a case (Creswell, 2014). Therefore, KMUTT will be analyzed under analytical framework developed from entrepreneurial university concept provided by Burton Clark. The ultimate research procedure is to write a flexible structure report providing an in-depth analysis of the case study (Research methods and data collection will be further explained in Chapter 5).

1.5 Significance and Contribution of the Research

The research aims to investigate the existence of entrepreneurial university in Thailand and to examine the dynamics of the pathway towards entrepreneurial university of KMUTT. The author expects the thesis to some extent investigate the status of entrepreneurial university concept of a Thai leading research university as well as identify obstacles the university is encountering. The research provided an analysis of KMUTT entrepreneurial university elements so that the university can further improve its institutional capacity. The highest expectation on the research is to help the university stakeholders such as government and industry to understand the current situation of Thai higher education and support Thai universities in achieving its mission and vision. Moreover, the study will be one of the first attempts to study about the entrepreneurial university concept in Thai higher education.

Chapter 2 Entrepreneurial University

2.1 Entrepreneurial University as a Concept

Entrepreneurial university concept did not explicitly exist in higher education research until some scholars noticed the changes in universities' behaviors to survive and adapt to unfortunate settings such as insufficient state funding. Entrepreneurial universities behave differently from traditional universities that their existence generates concerns and hopes among higher education researchers and policy makers. The concept is still new that it has been discussed and justified worldwide. The term entrepreneurial university can be interpreted in many ways as stated in an OECD report "A Guiding Framework for Entrepreneurial Universities" that the meaning of an entrepreneurial university is difficult to define and the definitions might not be fit perfectly to all universities (EC-OECD, 2012).

Entrepreneurial university definitions have generally been defined based on their behaviors in terms of financial management, external partnerships, production and application of knowledge and adaptation to changing environment. These categories of definitions also enhance the existence of each other. Some scholars such as Clark and Etzkowitz simply define universities which seek for various sources of income as entrepreneurial (Clark, 1998a; Etzkowitz, 2013). Some scholars such as Etzkowitz (1983) and Subotzky (1999) see university-firms partnerships as an entrepreneurial element for universities to generate income through patents, research contracts and private firm partnerships (EC-OECD, 2012). The activities make the entrepreneurial university become knowledge sellers as perceived by William (2003) and Jacob, M, Lundqvist and Hellsmark (2003) (EC-OECD, 2012). In terms of knowledge production and application, entrepreneurial universities activity such as university technology transfer is seen by Dill (1995) as a formal way to make use of university research by commercializing research result (EC-OECD, 2012). According to Chrisman, Hynes and Fraser (1995) new business ventures also emerge from academics, technicians and students of entrepreneurial universities (EC-OECD, 2012). Many scholars variously described the capability of entrepreneurial university to change in their environment. Clark (1998) stated entrepreneurial university is innovative. According to Kirby (2002), it is adaptive and risk taking. Also, Röpke (1998) stated

that entrepreneurial university environmental interactive to survive in their context (EC-OECD, 2012).

After decades of the introduction of entrepreneurial university concept, the definitions stated by some scholars have been broaden that entrepreneurial university concept has covered more university behaviors and become difficult to define in a single concept in higher education research. Entrepreneurial university is seen as the creator of startups produced from its human capital such as lecturers, technician and students (Chrisman, Hynes, & Fraser, 1995; EC-OECD, 2012). The potential contribution of university to its regions is also included in its definition that entrepreneurial university can contribute to regional development and be one of the key elements in Triple helix theory (Further described in 2.3). The entrepreneurial university also help countries enhance their national innovation system and economies (Etzkowitz, 2013). However, the concept of entrepreneurial university as a form of university transformation has not been totally accepted. Some scholars i.e. Slaughter criticizes the idea of entrepreneurial university (Slaughter & Leslie, 1997). The scholars perceive the responses of higher education institutions to global markets, financial stringency as well as other environmental uncertainties as “academic capitalism” which represents how public universities complies its higher education policies with the economic policy in responding to neoliberalism (Slaughter & Leslie, 1997, 2001). Slaughter was criticized by Van Vught about his ignorance on higher education environment conditions that are modernized and needed to change (Van Vught, 1999).

2.2 Entrepreneurial University in Asia

Altbach and Umakoshi stated that “No Asian university is truly Asian in origin – All are based on European academic models and traditions, in many cases imposed by colonial rulers, and in others (e.g., Japan and Thailand) on voluntarily adopted Western models” (Altbach & Umakoshi, 2004). The authors mentioned the undeniable western influence on Asian university feature including academic freedom, institution autonomy and the relationship of the university to society as well as other factors. At present, the clear traces of western influence on higher education policies in Asian countries still appear in the form of national policy documents, study visits of university policy makers, historical data collection, developed frameworks in higher education research and even the rationales used to justify the existing university behaviors.

The concept of entrepreneurial university as a type of university have been discussed widely among western scholars since 1980s (EC-OECD, 2012). The concept becomes one of the higher education trends emerged from western context which is discussed among scholars and policy makers worldwide including Asia. After decades of the spread of entrepreneurial university idea, universities in Asia either have adopted the concept or realized their entrepreneurial elements within them through the lens of western world. Some Asian universities are considered behaving entrepreneurially as a new higher education trend to be learnt from western countries to respond better to their environment, while others might find entrepreneurial activities as long been university customs. For example, some Asian universities collaborate with western universities in training their university staff to learn the entrepreneurial concept. According to Maastricht School of Management (MSM) in the Netherlands, the university arranged one week training program under the topic “The MSM Entrepreneurial University Transformation program” for university representatives from DR Congo, Ghana, Japan, United Kingdom, and Yemen. This training aims to guide university representatives to respond better to labor market demands and innovative economic development. The same theme workshop for South East Asia also was provided to twenty MSM alumni from Bhutan, India, Indonesia, Nepal, the Philippines, Sri Lanka, and Vietnam (Maastricht School of Management, 2016). However, Yokohama (2006) argued that entrepreneurial activities are old university practices such publication and consultant activities have long existed in universities (Yokoyama, 2006). In 2000, Etzkowitz, an American scholar tried to define the essential characteristics of the entrepreneurial university and its process of emergence (Etzkowitz, Webster, Gebhardt, & Terra, 2000). Three continents including Europe, Latin America and Asia were analyzed; the context of Asia covered only Japan. The author implied the similarities of three continents that research production for both basic and applied research were conducted in government institutes which were considered different from the USA context. Industry can still receive support from the technology transfer mechanisms from an institute while financial support increases. However, such process is rigid due to the shortage in state funding which was the result of slow recruitment of new ideas people (Etzkowitz et al., 2000). Yokohama (2006) stated that limited financial support from the state might advance the entrepreneurial behaviors within an institution (Yokoyama, 2006). This can imply that higher education in Asia also faces financial stringency problems like elsewhere.

Although entrepreneurial university concept has been spread worldwide, there is still no clear definition for the concept of entrepreneurial university. It is argued that new entrepreneurial university elements have been added to the existing entrepreneurial university models through time and the growing idealization of a university. Entrepreneurial university is still a new higher education trend in some Asian countries. As long as the definition is still continuously broadened, it is difficult to justify the existence of the type of university in one setting unless a clear definition and analytical framework are provided. At regional level, studies about entrepreneurial university are still limited and the definition of entrepreneurial university given is still too broad to define as a single definition. According to Wong et. al., new possible features of entrepreneurial university in East Asia keep emerging through literature. The empirical facts about the distribution of the concept, the possible expectation on regional variations and the impacts on university behaviors are still undiscovered. Moreover, there are little empirical work about entrepreneurial university in East Asian context (Wong, Ho, & Singh, 2007). At national level, entrepreneurial universities cannot be seen in one single model. Yokohama (2006), who studied the organizational change in Japanese and UK universities that engaged in entrepreneurial activities, argued that being an entrepreneurial type of university, a university does not necessarily have to be profit making, risk taking or commercialized. Instead, the researcher proposed in her research that entrepreneurial universities are those strive to be self-reliant and would want to be seen as being responsible for society as a whole (Yokoyama, 2006). Therefore, she proposed that an entrepreneurial university emerges from the need to respond to changing internal and external demands and universities have different degrees of entrepreneurial behaviors. There are two types of institutional response: (1) to be based upon business like and commercialized or (2) self-reliant and autonomous.

Research on entrepreneurial university in Asia has already existed mostly in East Asia. In 2010, Guerrero and Urbano did their research on “The development of an entrepreneurial university”. They tracked empirical studies about entrepreneurial university from 1995 – 2008 and some Asian countries appeared to be on the list including Korea by Ryu (1998), China by Eun et al. (2005), Japan by Yokoyama (2006) and Singapore by Wong at al. (2007) (Guerrero & Urbano, 2012). Until 2016, there are more research from Asian countries contributed to the knowledge pool about entrepreneurship in Asian higher education including Malaysia, Taiwan, Indonesia and Thailand (C. Reyes, 2016). Some scholars have been observing changes in Asian higher

education context and used analytical frameworks which developed from western contexts to analyze Asian universities. For example, Wong (2007), a Singaporean scholar used frameworks about knowledge production and economic development developed by Etzkowitz, Webster and Gebhardt, & Terra (2000) in his work about entrepreneurial university in Singapore (Wong et al., 2007). Yokohama, a Japanese scholar used Clark (1998) and Sporn (2001) in his work about organizational change in Japanese and universities in UK which are engaged in entrepreneurial activities (Yokoyama, 2006). (See existing research on entrepreneurial university in Asian context in Appendix B)

2.3 Theoretical Frameworks Related to Entrepreneurial University

There are various ways to identify the entrepreneurial university behaviors. Many frameworks have been developed to analyze entrepreneurial university behaviors (Guerrero & Urbano, 2012). Some guides of action also have been developed to support the creation of this type of university as it has been done by Gibb and OECD (EC-OECD, 2012; Gibb, 2012). According to Guerrero and Urbano, some scholars has developed theoretical frameworks to understand the development of an entrepreneurial university by identifying environmental factors to understand the relevance of university setting and university internal factors regarding transformation process.

Environmental factors are divided in formal and informal factors while, internal factors are divided into resources and capacities (Guerrero & Urbano, 2012). Guerrero and Urbano explain the details of each type of factors. Formal factors refer to university governance, entrepreneurship education and support measures for entrepreneurship. Informal factors cover internal stakeholders' perceptions about entrepreneurial spirit of the university, entrepreneurship teaching, incentives, internal training and demonstration. Resource includes human resource, finance, infrastructures and commercialization. And capabilities include university reputation, connections with external organizations such as locals and its organizational partners (Guerrero & Urbano, 2012).

Table 1 Theoretical models of entrepreneurial universities

Theoretical models of entrepreneurial universities		
Environmental factors		
Scholars	Formal	Informal
Clark (1998)	A strengthened steering core An expanded developmental periphery A diversified funding base	A stimulated academic heartland An integrated entrepreneurial culture
Sporn (2001)	Mission and goals Structure, management, governance and leadership Networks, conglomerates and strategic alliances	Culture
Etzkowitz (2004)	Interdependence with the industry and government and independence from another institutional spheres Hybrid organizational forms, Capitalization of knowledge	Renovation
Kirby (2005)	Incorporation, implementation, Communication, organization Encouragement and support	Recognition and reward, Endorsement, Promotion
Rothaermel et al. (2007)	Policies and technology	Culture
Internal factors		
Scholars	Resources	Capabilities
O'Shea et al. (2005, 2008)	Human capital resources Financial resources Physical resources Commercial resources	Status and prestige Networks and alliances Localization
Rothaermel et al. (2007)	Agents	Status Networks Localization

Source: Guerrero & Urbano, 2012.

Among research about entrepreneurial university done in Asian context previously stated, research done by Wong (2007) seems to be explore Asian universities while, others focus at national context (Guerrero & Urbano, 2012; Wong et al., 2007). Within his work, National University of Singapore (NUS) was described as a national university which was changing its role in knowledge-based economy development (Wong et al., 2007). The authors mentioned the university transformation from traditional role as educational providers and the creators of scientific knowledge to be an entrepreneurial university which commercializes knowledge as well as actively contributes to private sector in both local and regional economy. Wong et. al. aimed to fill the existing research gap by theoretically expanding the entrepreneurial university model to incorporate a number of additional emerging roles that the university needs to play to contribute effectively toward the transition of newly industrializing economies (NIEs) toward a knowledge-based economy (Wong et al., 2007). The developed model and the analysis of NUS entrepreneurial university behaviors were analyzed through theoretical frameworks provided by western scholars e.g. Etzkowitz's work. In his research, economic developments of each decade were described and it was pointed out that university has to review its old strategies when Singapore national innovation system increasingly focuses on knowledge commercialization and protection, Apart from Wong and his team, Reyes (2016) chooses National University of Singapore (NUS) as a case study and explore issues and situations affecting the entrepreneurial university via frame analysis to determine how institutional members frame the university as an entrepreneurial university (C. N. Reyes, 2016).

There are some efforts from Asian higher education scholars in developing some theoretical framework and entrepreneurial university models. For example, Thai scholars, Savetpanuvong and Pankasem (2014) developed an analytical framework by combining various concepts including three main features of entrepreneurial university definition provided by Jochen Röpke, Timmons model of entrepreneurial process, resource-based view, learning theories and diffusions of innovation (Savetpanuvong & Pankasem, 2014). Their research aimed to define entrepreneurial university, find out its keys characteristics as well as explain how the university supports technology entrepreneurs with innovation and societal responsibility. A Japanese scholar Yokoyama (2006), provided five types of entrepreneurial universities including a prototype (e.g. Tokyo University), an entrepreneurial-oriented university (e.g. Waseda University), a fledgling entrepreneurial university (e.g. Nottingham Trent University), an

adaptive entrepreneurial university (e.g. University of Surrey) and an ideal type (Yokoyama, 2006).

Apart from theoretical frameworks about entrepreneurial university, Triple Helix theory is known in the field of higher education as a theory describes relationship between university, government and industry. The theory does not represent only the relationship between state, university and industry, but also the changes within each actor (Etzkowitz & Leydesdorff, 2000). For example, like in the USA and many countries, universities are transforming its function from teaching oriented to research oriented (Etzkowitz & Leydesdorff, 2000). As the nature of knowledge and economic production are changing, at present the university is forced to involve more in regional and economic development. Each nation has different form of Triple Helix relationship (Etzkowitz & Leydesdorff, 2000). The theory is also used widely in many empirical studies regarding Asian context (See Appendix B).

2.4 Theoretical Framework by Burton Clark

According to Clark, entrepreneurial university is a university which increasingly enlarges its capacity and adapts its behaviors to respond to the growing demand in its environment including state, business, industry and society (Clark, 1998a, 1998b, 2004a). The university in Clark's context has to deal with continuous change and adapt effectively to changes, and also allows its features and individuals to become more effective than ever. Clark understands that universities are under pressures to transform themselves. They need to be independent by seeking for lots of income sources. Their managers and academics have to be change oriented and be part of the university funding portfolio. The university administrative and academic units are designed to collaborate effectively with external organizations and become more interdisciplinary and transdisciplinary. Theoretical framework developed by Burton Clark includes five core elements of entrepreneurial university: a strengthened steering core, an expanded developmental periphery, a diversified funding base, a stimulated academic heartland and an integrated entrepreneurial culture (Clark, 1998a) (the five elements will be further discussed in Chapter 5). As stated by Van Vught, Clark's work emerged from the idea that universities are under pressure in dealing with demand overload. Universities are not the only player in terms of knowledge providing. The institutions themselves have increasingly competed with other knowledge providing organizations such as firms, think tanks and public research centers as well as

information technologies that supply knowledge to prospective students (Van Vught, 1999). In Van Vught's work, entrepreneurial university shares the same characters as innovative universities that universities are adaptive to changing environments.

2.5 Conclusion

In conclusion, entrepreneurial university exists in Asian higher education. Entrepreneurship in higher education in Asia mostly based on western ideas in terms of the import of educational policies and analytical frameworks used in research. The scarcity of public resources is considered as a factor which leads to the introduction of entrepreneurial university. In terms of research done in Asian context, research about entrepreneurial university mostly covers East Asia and South East Asia accordingly. The existing research highly mentions the entrepreneurial university behaviors as the university transformation process to respond better to economic development.

Chapter 3 Thai Higher Education

3.1 Thai Higher Education from Past to Present

The emergence and changes in Thai higher education have been influenced by the country's political and economic policies (Sae-Lao, 2013). Thai higher education institutions have transformed themselves to respond better to the increase demands from politics and economy from outside and inside of the country. To understand the dynamics of changes in Thai higher education context, it is essential to study world history and national history as well as the influence of developed countries on the policy implementation within national context. In this research, the author divides Thai higher education from past to present into nine stages of development bases on political and economic changes at national level in each decade (See table 2).

Table 2 Changes in Thai Higher Education influenced by political and economic development in each decade

Stage	Year	Political situations	Economic situations	Changes in Thai Higher Education
1	1900s - 1940s	Absolute monarchy towards Constitutional monarchy (1932) Siam as Thailand (1939)	Open economy of the era of imperialism Relied heavily on the export of one commodity: Rice	The embracement of Western knowledge Higher education as part of modernization process (European models) The establishment of Chulalongkorn University (1917) and Thammasat University (1934)
2	1940s	World War II Strengthening of the nation against communists	Agriculturally-oriented And economic nationalism	The establishment of universities to serve political demands (European models) Kasetsart University (1943) Silapakorn University (1943) Mahidol University (1943)
3	1950s	Ally with USA and Inter- national organizations Democracy VS communism	1950 – 1975 Economic and military assistance from the USA	Thailand's university research development The transformation of Thai university's function, from the teaching-based to more research-based The Regional Educational Development Project Comprehensive University Idea

4	1960s	The expansion of the urban economy Urban proprietors, professionals, lower officials, shopkeepers and petty businessmen also grew rich, more numerous, and politically more significant	Agriculturally oriented towards Industry The free-market model Full foreign ownership of businesses First economic development plans Open Economy	King Mongkut's University of Technology (1960) The emergence of regional universities Chiangmai University (1964) North, Konkean University(1964) Northeast, Prince Songkla University (1967)South Private College Act (1969)
5	1970s	Democracy over military regime	Open Economy U.S. and Japanese aid and loan	University as a political force The establishment of The ministry of science (1979)
6	1980s	Private replace public sectors Military regime took over	Rapid industrialization – (1988) Ended of Bureaucracy Expansion in Higher Education	Mismatch of graduate profiles and labor markets More female students
7	1990s	After the coup of 1991 returned to democracy regime	1997 Asian Financial Crisis Market-oriented	The First Long Range Plan for Higher Education The National Education Act of 1999 Legislation to permit universities to mobilize their own resources Legalized Autonomous Universities
8	2000s	Democracy and coup	Recovering from Asian Financial Crisis Market-oriented Received aid from International Monetary Fund, direct investment from Japan and other countries	Legalized private universities National research university project The Second Long Range Plan for Higher Education Reform (2007)
9	2010s	Under Military regime in 2014	Thailand 4.0 Science and Technology	More autonomous universities University autonomy prompts concern over student fees(2013) State Intervention State uses Article 44 in tackling “ugly problems” (2016) 170 Higher education institutions (2017)

Source: (Baker & Phongpaichit, 2014; Boonpen, 2016; Chao, 2017; Chapman & Chien, 2014; Daorueng, 2016; KMUTT, 2017; Lamubol, 2013; Phongpaichit, 1980; Rungfamai, 2011; Sae-Lao, 2013; Sinlarat, 2004) and author.

Stage 1 (before 1940s): Higher education as part of modernization process

In the past, all levels of education were provided to Thai people in Buddhist temples where monks were teachers (Rungfamai, 2011). The great education reforms in Thai education in the past were initiated and promoted by three kings: King Mongkut (reigned 1851-1868) initiated the idea of opening up to western knowledge, King Chulalongkorn (reigned 1868-1910) established a proper school system and King Vajiravudh (Reigned 1910-1925) established Chulalongkorn University as the country's first university in 1916 (Baker & Phongpaichit, 2014; Chulalongkorn University, 1987; Rungfamai, 2011). Almost two decades after the reforms under monarchy supervision, Thammasat University, the second university, was established in 1934 by Pridi Panomyong who was the leader of the coup that changed political regime from absolute monarchy to constitutional monarchy (Sae-Lao, 2013).

Before 1950s, the higher education reforms to serve political demands were explicit. The role of higher education institutions at the time was not to pursue excellent in academics, but to benefits political demands, build and modernize the country (Sae-Lao, 2013). The role of education both domestic and abroad created the new ruling class in Thai society which made higher education perceived as another channel for individuals to upgrade their social status (Rungfamai, 2011). Both kings and governments, who were at the top of the governing hierarchy in the past, felt the need to modernize the country not to be colonized by western countries and be invaded by communism (Rungfamai, 2011; Sae-Lao, 2013). The fact that the country was not colonized by western powers made the emergence of its higher education different from other Asian countries. Thai universities were not emerged to serve colonizers but to be a part of the country's modernization process. Thailand, similarly to Japan, carefully adopted western ideas especially European model in its early stage of education system including higher education (Altbach & Umakoshi, 2004; Sae-Lao, 2013). The influence between higher education and economy did not seem to be as strong as the force from political side. Thai economy in the past was heavily based on agriculture that before 1930s Thailand's economy relied significantly on exporting one commodity "rice". Therefore, higher learning in the past including training practitioners as well as architects for house building and design, was sufficient in corresponding to the needs of the past society (Phongpaichit, 1980; Sinlarat, 2004).

Stage 2 (1940s): The emergence of higher education to serve political demands

After Siam was renamed Thailand in 1939 (Baker & Phongpaichit, 2014), the country continued restructuring the governing bodies into ministries to respond better to the change in economy. Some universities were upgraded from government official training and profession schools to specially serve the national demands of specific ministries. For instance, Thammasat University was expected to train legal professions, enhance democracy and educate mass amount of Thai citizens (Sinlarat, 2004) and Kasetsart University was upgraded from a school under Ministry of Agriculture control (Sae-Lao, 2013). Sae lao (2013) stated that the emergence of these pioneering universities was mainly meant to serve bureaucracy and ministries. After the Second World War, Thailand reopened its economy after its economic nationalism policies (Phongpaichit, 1980). However, the role of Thai higher education in developing Thai economy was not significant.

Stage 3 (1950s): American model, the university function transformation

During 1950s, Thailand allied with the USA for both political and economic development and financial support. Sarit's government, which had the USA as a patron in maintaining their military power (Baker & Phongpaichit, 2014), actively promoted economic development and made education as first priority (Rungfamai, 2011). Rungfamai stated that the influence from the country collaboration with the USA forced universities to transform their missions from teaching to research. It was the very first time that Thailand higher education learnt about the concept of "Research" from the Western world (Rungfamai, 2011). Moreover, the country started receiving policy advice from World Bank in 1957 (Rungfamai, 2011). State tried to maximize the economy openness and legalized institutional framework to support the growth of private sector (Phongpaichit, 1980). The legalized frameworks and regulations boosted up the accessibility to Thai higher education that state started discussion about the approval for the establishment of private higher education in 1955 which was finally led to the issue of "Private College Act" in 1969 (Sinlarat, 2004). State restructured higher education system for better coordination by moving the institutions from being under ministries to be under the power of Office of Prime Minister (OPM). In 1959, the state established the Office of the National Education Commission (ONEC) for educational strategies and planning centralization as well as the Office of National Research Council of Thailand (NRCT) for better research coordination and cooperation as part

of the Prime Minister's Office (Rungfamai, 2011; Sae-Lao, 2013) . Furthermore, the accessibility to education including higher education was increased through the establishment of the Regional Educational Development Project including Higher Education (REDPHE) in 1958 (Sae-Lao, 2013).

Stage 4 (1960s): The massification of higher education and the emergence of regional universities

Thai universities was importantly seen by Thai government as part of steering the country from agriculture society towards industry in the beginning of 1960s (Rungfamai, 2011). Sae lao (2013) argued that Thai higher education policy between 1960 and 1980 was significantly affected by the influence of the USA, changes in country's politics and society as well as global economy (Sae-Lao, 2013). It is mentioned that after the establishment of the regional educational development project in 1958, new American model universities which were designed to be comprehensive universities including Chiang Mai University(1964), Khon Kean University (1965) and Prince of Songkla University (1967) were founded to fulfill the need for higher education in different regions of Thailand (Sae-Lao, 2013). The government's economic plan stimulated the need for more higher education institutions. Higher education before 1960s was located in central area of the country. This caused less opportunity for rural students to access higher education. The high demands for universities followed the demographic change in economy and led to the establishment of regional universities.

Stage 5 (1970s): Universities as a political force

According to Rungfamai (2011), Thai universities played important roles in Thailand historical events such as the establishment of the modern bureaucracy, the Siamese Revolution of 1932, and the October 14 incident in 1973 (Rungfamai, 2011). In 1973, the political change that brought democracy over military regime was led by university students from various institutions. Students rose up against Thanom government in 1973 (Baker & Phongpaichit, 2014). University became voice of citizens and universities were places for students to gather and exchange opinions. At the end of the decade, there was the establishment of the ministry of science which was expected to replace National Research Council of Thailand (NRCT).

Stage 6 (1980s): The dominance of private sector and the mismatch of graduate profiles and market demands

Prem Tinsulanond was appointed to be a prime minister to end conflicts and turmoil (Baker & Phongpaichit, 2014). It was a decade for universities to adapt for the change in societal and economical demands. Private sectors replace public sectors and became major employers of graduates. They paid higher salary compare to state. However, universities were too slow to adapt to the rapid change in market demands that their graduates were not qualified enough to serve rapid industrialization. Thai economy reached its peak in 1988 where its GDP reached 13%. In addition, there were more female students accessed into higher education than ever.

Stage 7 (1990s): State and the idea of autonomous university

Thailand after the coup of 1991 returned to democracy regime (Haggard & Kaufman, 1995). Phongpaichit and Baker (1998) as stated in Sae lao (2013) mentioned that the intention to serve bureaucracy among Thai higher education graduates was weakened by the 1980s while, there were higher demands for white collar workers, engineers, and businessmen (Sae-Lao, 2013). Thai university mission was significantly changed due to the change in economic policies and became more market oriented. In 1997, the country encountered Asian financial crisis where governments struggled with scarcity of resources. According to Suwantragul stated in Sae lao (2013) Thai government allows universities' legal resources mobility (Sae-Lao, 2013). In 1999, Thailand promulgated the National Education Act of 1999 and legalized the status of autonomous universities as well as made the implementation of Quality assurance policy compulsory to all educational levels (Sae-Lao, 2013).

Stage 8 (2000s): New public management, private university legalization, external quality assurance and university entrepreneurial behaviors

The nation for more than half a decade was under the govern of prime minister Thaksin Shinawatra and later was under militarily coup government (Baker & Phongpaichit, 2014). Thailand started recovering from the Asian financial crisis in 1997 and received financial aid from International Monetary Fund (IMF) as well as experienced foreign direct investment from other countries such as Japan and the USA. The economic situation at the time stimulated Thai state to open up for privatization. Idea of New Public Management (NPM) started appearing in

Thai higher education sector. Brown stated in Sae Lao (2013) that New Public Management aims to promote private sector ideas in public sectors. Sae Lao pointed out that NPM is an example of Thai policies influenced by western ideas. The emergence of NPM can be seen through the efforts of Thai government in promoting autonomous universities to instill private sector values and expected those universities to have greater institutional autonomy, administrative management, and financial flexibility (Sae-Lao, 2013). Moreover, the state allowed private higher education to be operated legally. In 2003, state legalized private universities which were later than some other Asian countries such as Laos (1995), Malaysia (1996) and China (2002) (Chapman & Chien, 2014). At the beginning of 2000s, the Office for National Education Standards and Quality Assessment (ONESQA) was established after the idea about external quality assessment has been discussed since 1996. The establishment of ONESQA, the Thailand's only educational external assurance public agency which was expected to be run like private organization, was influenced by NPM (Sae-Lao, 2013). The Asian financial crisis in 1997 influenced greatly on the idea of promoting autonomy and the existence of entrepreneurial also activities among Thai universities (Rungfamai, 2011). Rungfamai argues that Thai universities have changed its behaviors to be more market driven after the Asian financial crisis and from that the introduction of the new behaviors facilitates Entrepreneurial culture especially the increasing funding channels of universities (Rungfamai, 2011).

Stage 9 (2010s): 2010 – 2019 National research university projects, the period of graduate schools and state intervention

This part of research provides the ongoing higher education situations such as National research university project, the period of graduate schools and state intervention.

National research university project

At present, Thailand's production and human resource quality was significantly indicated by its competitiveness in research (Rungfamai, 2011). Since 2009, nine universities were selected to be under national research university project during 2010 to 2012. They received financial support for 12 billion baht from government (Chapman & Chien, 2014; Sombatsompop et al., 2010). According to national research universities report, research universities are expected to enhance academic excellence and Thailand's competitiveness as well as support economic and social development of the country (OHEC, 2011).

The period of graduate schools

Thailand, as one of the middle-income nations together with Malaysia, has been expanding and investing its graduate education to equip workforce with higher education with the belief that the sector will attract international investment and finally enhance national economic development. With this goal in mind, those high ranking universities are under pressure to achieve global reputation (Chapman & Chien, 2014).

State Intervention

The enforcement of Article 44, which was invoked after the coming to power of military government in 2014, grants full authority to Prime Minister General Prayuth Chan-ocha to take any actions for national peace protection (Daorueng, 2016; Lamubol, 2015). Under this law, anyone can be held up by authorities without warrant up to seven days and prohibited not to gather in public in a group more than five people (Lamubol, 2015). In higher education context, the law allows “the Ministry of Education to intervene in university affairs”(Daorueng, 2016). This article has supported authorities in detaining and preventing Burapa University students’ public gathering against their university changing to Autonomous university mission (Lamubol, 2015). The university student movements (Burapa University, Kasetsart University and Chiang Rai Rajabhat University) protested against the transformation to be autonomous universities (Lamubol, 2015). Their overall reasons for being against the transformation are due to the raise in student tuition fee, unsatisfied level of university transparency and the less opportunity for university student participation in the university making process. However, State shares positive view on the use of section 44 that the act might help state tackle with the chronic problem of universities trying to maximize profits. The absolute power of section 44 helps Thai government deals with corrupt matter in Thai higher education. For example, ten universities were found to run graduate programs mostly for profit without the intention of improving quality (Boonpen, 2016). In one case, the state investigated Bangkok Thonburi University (BTU) after it was accused for over recruiting 2,500 Master’s degree students into its education management program even though the program is allowed to accept only 500 students annually (Boonpen, 2016).

2.2 General information about Thai higher education in present

Since 2009, Thai higher education has granted more autonomy to more universities especially research universities and regional universities. Moreover, the higher education sector has opened more of its space for private institutions and foreign universities. The context of Thai higher education is moving towards market driven that universities are forced to compete for scarce resources and survive the more competitive environment (See table 3).

Table 3 Number of Thai Higher Education Institutions in 2016

		2009 (Rungfamai, 2011)	2016 (OHEC)
Public higher education	Autonomous universities	11 autonomous universities+2 autonomous Buddhist universities	21 autonomous universities+2 autonomous Buddhist universities
	Other public universities	84	59
	Total	97	82
Private higher education		69	75
Total		166	157

Source: (OHEC, 2016; Rungfamai, 2011) and author.

3.2 Thailand 4.0 and Its Idealization of Higher Education

Over 20 years, Thailand has strived to escape from middle income trap to be among high income and sustainable income countries. Even though it is resourceful, the country cannot develop further to escape the middle income trap because it depends on ideas and innovations from other countries. Throughout centuries, the country has been through 3 periods of economy development including Thailand 1.0, Thailand 2.0, and Thailand 3.0 (See figure 1). Thailand started from version 1.0 where the country lived in Agrarian Society and Cottage Industry. Then, it went through “Industrialization phrase” when the country was cherished by light industry, import substitution, natural resources and cheap labors. Not long after the country has welcomed “Globalization phrase”, Thailand is at version 3.0 where its economy depends on heavy industry,

export promotion and inward foreign and direct investment. In 2016, Thai government has heavily announced and promoted country’s plan to achieve Thailand 4.0 where the country will be more independent from other countries’ resources, be more innovative and have more startups (StartupThailand, 2016).

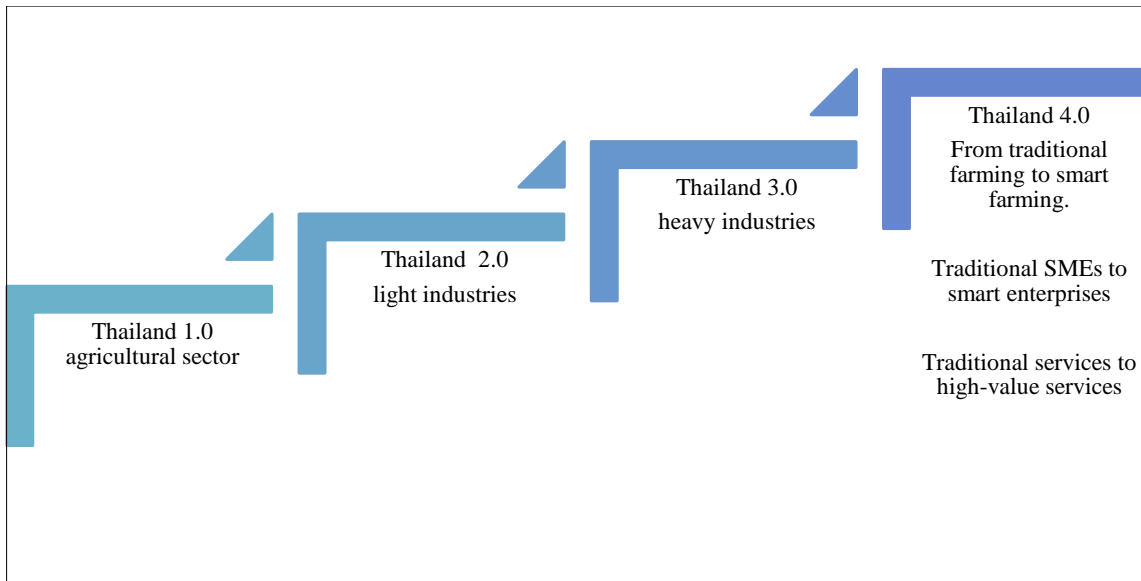


Figure 1 Thailand 4.0 and the types of industry. Source: Own depiction from data by Ministry of Commerce, 2017.

Thailand 4.0 economy model requires the country to restructure its economy to be driven by innovation. Key concepts towards the model are “Less is more” and “Innovation and creativity”. The economy has to change from conservative agriculture to modern agriculture. Government has to support medium-sized enterprises (SMEs) to be smart enterprises and startups. Services have to change from low value service to be high value service with technology support. In addition, the country has to focus on the production of experts instead of labors. The government emphasizes the change together with the reform in education. The country transformation towards the value-based economy under the “Less is more” concept means the nation has to focus on innovation, technology and creativity and trade in services instead of normal commodities, industries and trade in goods. While moving towards Thailand 4.0, Thailand is looking at its strengths in its biological variety and various cultures. Thailand sets its priorities for innovations as “New engines of growths” including food, agriculture and bio-tech, health, wellness and bio-med, smart devices, robotics and mechatronics, digital, IT and embedded technology and creative, culture and high value services. The new priorities are expected to bring

change to Thai economy. Thai policy makers believe that to bring change in economy, new approaches mentioned should be introduced (StartupThailand, 2016).

Thai education is under pressure to respond to the demands of state and industry. It is the role of education to qualify its people, especially next young generation, to be the country future forces. Thailand has learnt from successful developed countries that the country can not only rely on a small group of producers but various types of producers who are able to catch up with global trends. Thai government encourages Ministry of Education to adjust the curriculum for the upcoming change in Thai economy. Currently, Thai government promotes science and technology education as well as startups as they are seen as keys to improve Thai economy (StartupThailand, 2016).

3.3 Thai Research Universities and Its Entrepreneurial Behaviors

According to national research universities report, research universities are promoted to enhance academic excellence and Thailand's competitiveness as well as support economic and social development of the country (OHEC, 2011). Therefore, they are expected to be the forefront universities to effectively respond to the nation's demands. According to Office of higher education commission (OHEC), there are nine research universities in Thailand. Since 1999, a number of research public universities in Thailand have been granted autonomy in the area of financial, personnel, and academics affair. While private universities mostly focus on teaching and learning 13 out of 65 public universities are promoted to support the country's social and economic development by engaging themselves with research mission (Irawati & Rutten, 2013). Less dependence on the government budget and the need to gain external financial support push the universities to become more entrepreneurial (Intarakumnerd & Schiller, 2009) while trying to respond to societal and industrial demand.

To excel in research priority has long been challenging for Thai research universities. Apart from public support, industry and companies are considered as main potential external stakeholders and private funders. Although government, universities and research agencies have worked to improve the effectiveness of economy by promoting university-industry linkages, universities do not contribute enough to the industry (Intarakumnerd & Schiller, 2009). Thai universities are considered as knowledge sources, key innovators and economic development drivers (Intarakumnerd & Schiller, 2009; Mongkhonvanit, 2014). However, there are still problems

about the mismatch between the demand from industry and society and supply of knowledge as well as manpower from university (Schiller & Diez, 2007). Instead of conducting research and development (R&D) which responds to the demand of industry, Thai universities research is mainly focused in academic purposes (Sae-Lao, 2013). In addition, universities as science and technology suppliers fail to provide qualified manpower, especially Master and Ph.D. degrees graduates (Intarakumnerd, Chairatana, & Tangchitpiboon, 2002). According to Schiller (2007), university-industry linkage in Thailand is still limited. Massive Thai and foreign companies tend to develop in-house R&D capacities instead of asking for support from universities (Schiller & Diez, 2007). However, small and medium-sized enterprises (SMEs), which are the majority or 99.8 percent of local firms, still have to conduct R&D through collaboration with universities (Irawati & Rutten, 2013). Schiller (2007) suggested that to benefit from their research discoveries, universities should focus more on university-industry linkages by providing researchers more support (Schiller & Diez, 2007).

Regarding to the analysis of Etzkowitz (2013) about entrepreneurial university, there is always some possible conflicts when a university maintains both teaching and research roles (Etzkowitz, 2013). However, the irrelevance between Thai research university missions and the quality of research and graduates expected from industry raises concern about the capability of Thai research universities in dealing with teaching and research missions and how universities are being operated in response to the demand of industry and society.

3.4 New Public Management and Thai Research University Entrepreneurial Behaviors

New public management (NPM) is a mode of governance which have influenced public sector in many countries (De Boer, Enders, & Schimank, 2007). Some collected agreeable characteristics of the new public management are budget cuts, vouchers, performance auditing and measurement, decentralization and privatization etc. (Gruening, 2001). NPM has been used as a new way to improve European public organizations to be more effective and efficient (Sporn, 2003). The principles of NPM have brought governance and management reforms in European Higher education institutions (HEIs). There are still some existing controversial debates among policy makers and academics whether NPM will be a successful “management fad” or just a disappointment, this type of governance is believed to be the solution to major problems in higher education and research of which many universities are facing. In Thai higher education

context, NPM was introduced as a result of the state decentralization and the transfer of authority from state to universities (Sae-Lao, 2013). The Asian financial crisis in 1997 influenced greatly on the idea of promoting autonomy and the existence of entrepreneurial activities among Thai universities (Rungfamai, 2011). Brown (2004) as stated in Sae Lao (2013) explained that NPM is used to promote private sector ideas in public sectors. Sae Lao pointed out that the emergence of NPM can be seen through the efforts of Thai government in promoting autonomous universities to instill private sector values and expecting those universities to have greater institutional autonomy, administrative management, and financial flexibility (Sae-Lao, 2013). The establishment of ONESQA, the Thailand's only external assurance agency which was expected to be run like private organization, was influenced by NPM (Sae-Lao, 2013). Some scholars agree that the greater autonomy generates Entrepreneurial behaviors among some Thai universities. Rungfamai (2011) argues that Thai universities have changed its behaviors to be more market driven after the Asian financial crisis and from that the introduction of the new behaviors facilitates entrepreneurial culture especially the increasing funding channels of universities (Rungfamai, 2011). As Intarakumnerd and Schiller (2009) reported, a number of public research universities in Thailand have been granted autonomy in the areas of financial, personnel, and academics affair. Therefore, the universities become less depending on the governmental funding, gain external financial support and push the universities to become more entrepreneurial while responding to society and economic demands (Intarakumnerd & Schiller, 2009). OHEC restructures Thai autonomous universities by granting autonomous status through the legal framework for universities to have more institutional autonomy, flexibility, and self-management. After receiving the autonomous power, universities are controlled by university councils with their own institutional legal framework (Asian Development Bank, 2012). The governance of Thai public universities at institutional level can be seen mainly in two different ways bases on the type of institutions: public universities under state's control and autonomous universities (OHEC, 2016). According to OHEC, there are nine research universities: Mahidol University (MU), Chulalongkorn University (CU), Chiang Mai University (CMU), Prince of Songkla University (PSU), Kasetsart University (KU), Khon Kaen University (KKU), Thammasart University (TU), King Mongkut's University of Technology Thonburi (KMUTT) and Suranaree University of Technology (SUT). In 2015, state approved the bills for three universities to become autonomous including KU, KKU and TU became autonomous under state

supervision (Lamubol, 2015) which finally made all research universities labeled as autonomous universities and allow the universities to be able to manage their finances, programmes and curriculum design, as well as campus investment while receiving an annual block grant from the government.

Chapter 4 Case Study: King Mongkut’s University of Technology Thonburi (KMUTT)

4.1 KMUTT as a Case Study Institution

In this study, KMUTT is chosen as a case study for two main reasons. First, KMUTT has been the only university which is mentioned in science technology and innovation policy report of UNCTAD as a good example of Thai universities with industrial linkages and various sources of income (UNCTAD, 2015). The various funding channels and the collaborations with external organizations are coherent with some entrepreneurial university elements in its university’s behaviors such as “the diversified funding bases” and “the extended periphery” provided by Burton Clark (Clark, 1998a; KMUTT, 2017). Apart from Clark’s concepts, KMUTT mission also covers some of the ideas of the first phrase of entrepreneurial university model or “entrepreneurial university one” stated by Etzkowitz that the university is able to determine its strategies and gain its income through different funding channels (Etzkowitz, 2013; KMUTT, 2017). Second, there is no existing empirical study about KMUTT even though the university stands among nine Thai notable research universities. Therefore, the author aims to contribute to Thai higher education by conducting research about KMUTT.

4.2 The Establishment and University Mission

KMUTT has its name after H.M. King Mongkut whom is considered as “Father of Thai Science”. The university has been known as one of the nine Thailand’s national research universities and the first autonomous public university of the country. The university has strong reputation in its innovative programs, strong curricula in science, technology and engineering as well as university industry linkages (KMUTT, 2017). KMUTT originally was established in 1960 as Thonburi Technology Institute (TTI) for training technicians, technical instructors and technologists. In 1971, TTI became King Mongkut’s Institute of Technology (KMIT) after the institute was combined with other two technical institutes including North Bangkok Technical Institute, and Nonthaburi Telecommunication Institute. KMUTT was merged and governed under the supervision of the Department of Vocational Education which was part of Ministry of Education. The merger led KMUTT to constitute three campuses and TTI was recognized as

KMIT Thonburi campus. In 1986, the technology act granted autonomy to the KMIT group and allowed KMIT Thonburi campus to become King Mongkut's Institute of Technology Thonburi (KMUTT). This finally allowed KMUTT to become the first autonomous public universities in Thailand in 1998. The university administrative system follows the theme of international government owned universities. The autonomy received from state allows the university at present to have full authority in managing its income, expenses and property. Moreover, KMUTT also has a full right to establish its faculties, departments and new academic programs.

KMUTT claims its strength in architecture, bio resources, energy, engineering, environment, linguistics, science, and technology. Overall, the university secures the top 5 for research and top 10 for teaching in a ranking provided from Ministry of Education. In 2011, the university ranked 8th among Thai universities in Webometric ranking and ranked 1st of research institute in SCImago institution ranking (KMUTT, 2017).

According to KMUTT's website, the university currently sets its goal in achieving five visions.

- committed to the search for knowledge
- determined to be at the forefront of technology and research
- maintaining the development of accomplished and proficient graduates
- endeavoring for success and honor for community
- striving to become a world-class university

4.3 Demographics and Field of Study

KMUTT is considered as a medium sized university. KMUTT has widened its educational reach by having 2 campuses including KMUTT Bangmod Campus and KMUTT Bangkhuntien Campus. The university opens its campuses to both full time and part-time students. In 2012, the university educated 16,438 students including 11,666 undergraduate students and 4,772 graduate students respectively. KMUTT university staff number was 1,209 combining 543 teaching staff, 101 researchers and 565 supporting staff. In 2011, the university covers 47 programs and 147 fields of study across a range of disciplines and degree qualifications cover bachelors, masters and doctoral levels. There are 12 study fields provided at KMUTT: faculty of industrial education and technology, school of bio resources and technology, school of information technology, school of energy environment and materials, faculty of science, faculty of engineering, graduate

school of management and innovation, institute of field robotics, school of multidisciplinary sciences, school of architecture and design, school of liberal arts and the joint graduate school of energy and environment. There are 6 schools provides 51 programs for undergraduate studies while, 12 schools provide 96 programs for graduate studies. For international study schools there are 11 programs for undergraduate studies and 6 schools 22 programs for graduate studies.

As stated in its vision, KMUTT is striving to the search for knowledge to be at the Forefront of Technology and Research and a world-class university. This leads to its mission in developing students in learning, being excellent in academics, morality and work ethics. Moreover, the university develops the educational systems, educational quality assurance systems, learning systems and continuous quality management systems. KMUTT produces research and applies the findings to formulate knowledge as well as develop the Thai community. KMUTT sees itself as a research university serving as both academics and industrial arenas. Its presence will enhance the country's economy and quality of life through research and academic services.

4.4 University Partnerships

The university develops connection with other organizations at national and international levels. At national level, the university partners with both public and private organizations. KMUTT has increasingly involved in international collaboration due to rapid developments in scientific communication, economic, politic and education terms at international level. Apart from having collaboration with global associations, the university has partnered with other universities. KMUTT promotes education and academic research cooperation by partnering with almost 130 international universities and institutes through agreements. This made it is possible for KMUTT to collaborate with international partners in areas through research, lectures, symposiums, the exchange of information and materials. The university mainly builds partnerships through faculty connections and most of KMUTT partnerships are at the university level and the faculty level respectively. Before developing into more formal partnerships, prospective partners may start partnering through a joint research project, student exchange, expanded joint research, and scholarship, faculty exchange, joint research, short-term scholarly visits or internships (See Appendix C for KMUTT external organizations engagement).

4.5 University Administrative Structure

At the top of KMUTT administrative chain is university council which is a combination of internal stakeholders including KMUTT internal stakeholders such as representatives from academics, administrators, alumni and others. The university council plays a key role in making final strategic decisions regarding the direction of university. Below the council, there is a president who maintains the full authority. Under the president are four vice presidents who are responsible for four branches: research and innovation, academic affairs, administrative affairs and campuses. There is also an academic council which handles academic welfares and forwards the voices of academics to the university central administration (See figure 2). (The university Administrative Structure will be discussed more in Chapter 6).

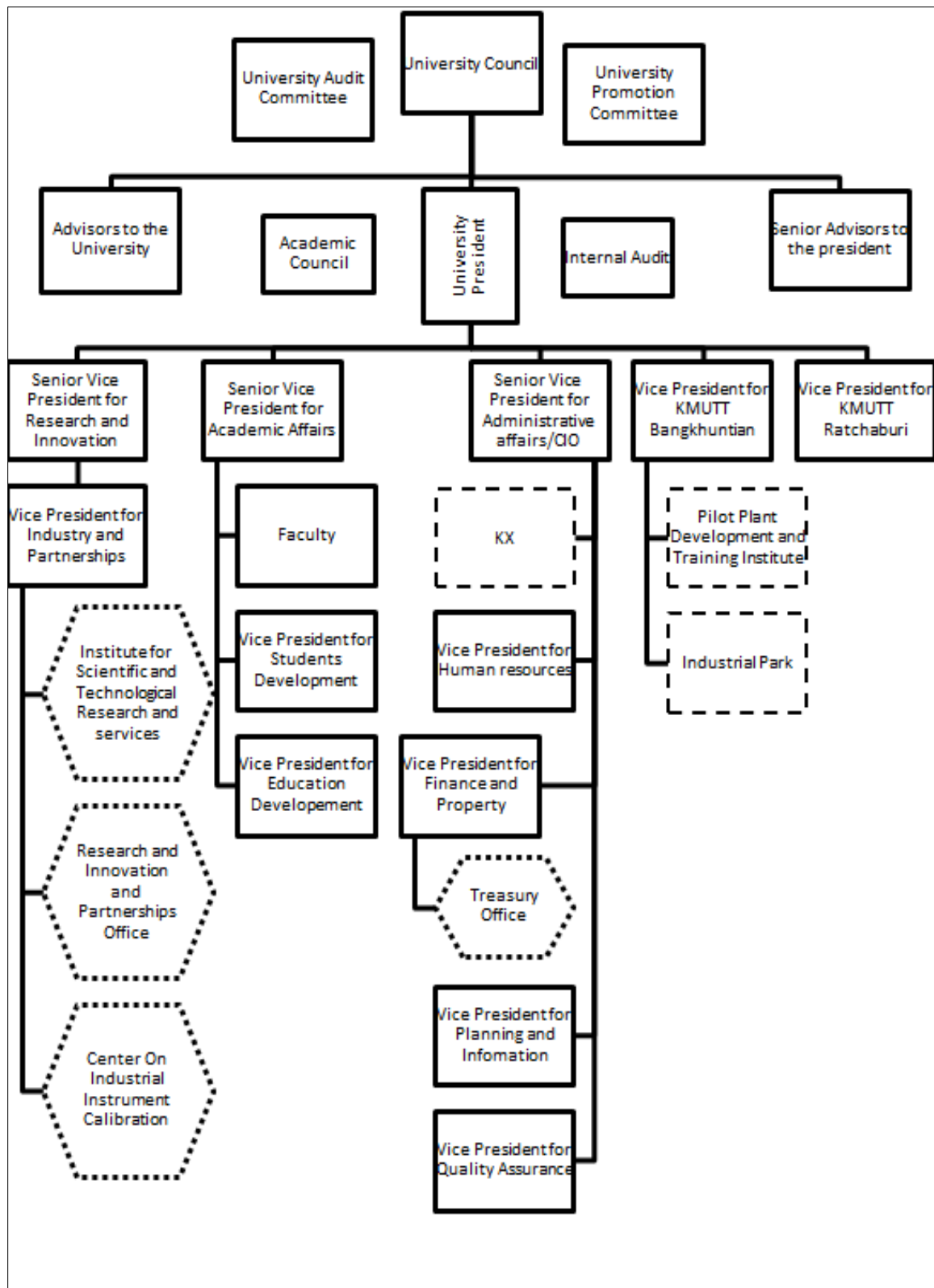


Figure 2 KMUTT University Administrative Structure. Source: own depiction based on the university administrative structure on KMUTT's website (2017).

4.6 University Funding

In terms of finance, KMUTT receives funding from government, students and external organizations. KMUTT and other eight research universities have received additional financial support from OHEC to enhance the overall quality of Thai higher education and to enhance the country's competitiveness. The money receives from state is spent on salary and permanent wages, subsidies, operating budget and for investment. The research fund is from external funding and government funding and university funding (See figure 3). (See more information about the university income in Chapter 6)

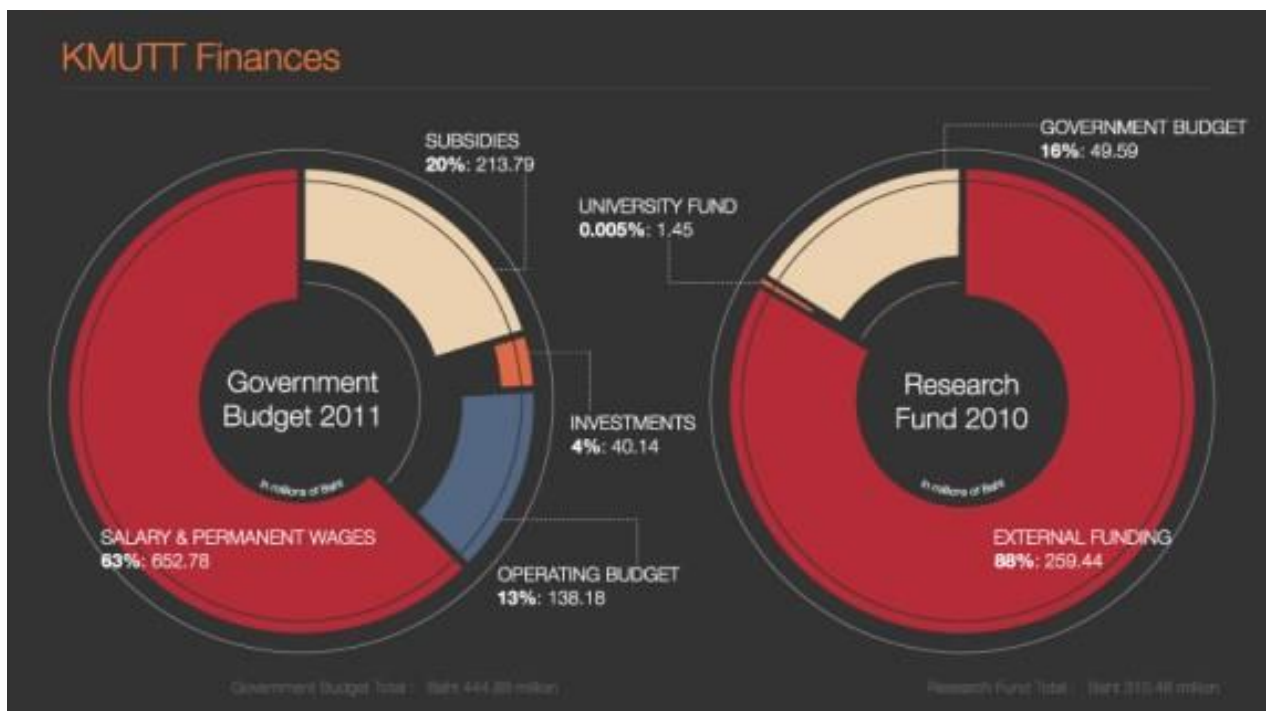


Figure 3 KMUTT Finances. Source: KMUTT, 2017¹.

¹ The most updated information about university funding was requested by the author. However, the information from KMUTT website was the only accessible and the most updated source.

Chapter 5 Research Methods and Data Collection

5.1 Research Methods

This study uses qualitative methods to explore and understand how KMUTT has been operated as entrepreneurial university. Qualitative research is a way to discover and interpret how individuals or groups perceive and frame a matter relating to society and mankind (Creswell, 2014). This study makes use of case study research strategy which is seen as one of research strategies commonly used in qualitative research (Stake, 2000). Yin 2003 cited in Kohlbacher that case study is a favorable research strategy for researchers who want to find answers to "how or "why" questions, when the researchers have small control over the case study and the case study investigation emphasizes on the present circumstances of some real life context (Kohlbacher, 2006). Case study mainly used in evaluation field and should be developed an in-depth analysis of a case (Creswell, 2014). In this study, the author uses KMUTT as a case study. The author collected data and provided in depth analysis of the research by applying the deductive form of qualitative content analysis (Further explained in 5.4).

5.2 The Analytical Framework

A theoretical framework developed by Burton Clark is used to answer the research questions, frame the research focus, and narrow down the range of data collection as well as structure thesis analysis section.

5.2.1 Clark's five elements of entrepreneurial university concepts

The five entrepreneurial university within the analytical framework are developed from five university case studies which are unique in terms of instill values and the culture development. Clark's five elements of entrepreneurial university concepts are interwoven and influenced by developed ideas and concepts of its university staff through time (See figure 4).

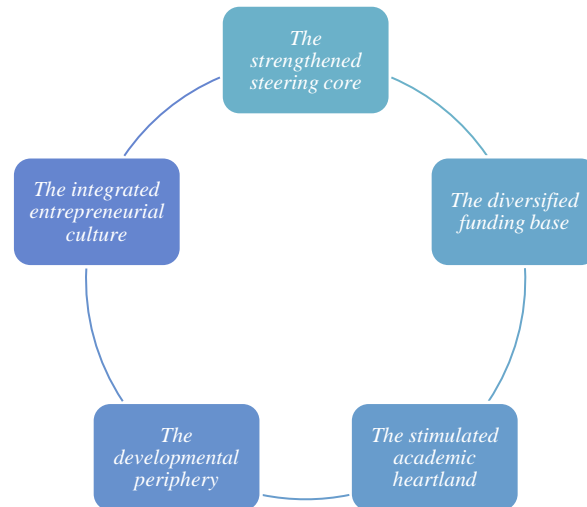


Figure 4 Clark’s five elements of entrepreneurial university concepts. Source: own depiction based on Clark (1998).

Below is the description of five elements of entrepreneurial university in Clark’s work (See more details of each element in Chapter 6). The framework will help justify the existence of entrepreneurial spirit in KMUTT.

The diversified funding base

Considering that an entrepreneurial university sees adapting to change as its character, the university needs more funds especially some amount of money to spend on things that are not considered necessary but that may be useful. It is important for the university to be able to find more financial resources from various channels since the government support as part of budget is declining. To reduce dependence on government, the university tries to find other major sources such as from research councils and competes for grants and contracts. Moreover, other sources of income are from industrial firms, local governments, and philanthropic foundations, to royalty income from intellectual property, earned income from campus services, student fees, and alumni fundraising. These sources of money help the university in dealing with both direct and indirect expenses (Clark, 1998a, 2004a).

The expanded developmental periphery

This element involves the university’s ability in reaching over its old university boundaries. In comparison to traditional universities, an entrepreneurial university has units which are friendly

enough to connect with outside organizations. Clark added in his work in 2004 that these units appear in the form of interdisciplinary and transdisciplinary research which concentrate on development in broad ranges of problem areas from societal to global (Clark, 2004a). The units excellently work on knowledge transfer, industrial contact, intellectual property development, continuing education, fundraising, and even alumni affairs. The university cannot only depend on academic departments based on disciplinary fields of knowledge, however, still values them as a powerful valuable asset. Interdisciplinary project-oriented research centers are seen as another priority of the group and developed alongside the academic departments. The projects initiated by external stakeholders who want to solve economic and social development issues are brought into the university. These project functions can be easily initiated and ceased. As the business deal between the university and the external groups keep carrying on, the university's infrastructure also keeps growing. It requires substantial organizational creativity for an entrepreneurial university to deal with the demands of society confidently by promoting non-traditional units' as new periphery. From Clark's perspective, this type of university broaden the university behaviors and not only teaching, research and learning for youth (Clark, 2004a).

The strengthened steering core

Entrepreneurial university is a university that transform from a traditional university to an ambitious university in order to respond better to expanding and changing demands. As stated by Clark (1998), the university craves a greater managerial capacity which helps the university to become quicker, more flexible and more focused to the changes (Clark, 1998a). Clark argues that universities with already well reputation and serve as the pillar of countries are likely to overlook the importance of the steering core element since they depends on their well-known status, secure resources from governments and competitive condition. Although the core can appear in various forms in different universities, the most common shared objective among those universities is that they embrace central university managers and academic departments as well as make this idea compatible with the existing traditional values of the universities (Clark, 1998a). In his work published in 2004, he explained further that the administrative line is strong at all levels from top to bottom. Development officers, technology transfer experts, finance officials and staff managers actively bring changes and income. The core generally consists of departments craving for more autonomous and better position among internal competition,

administrative team concerning about the whole university integration and the solutions to support weak departments. It is essential that the university core involves academics in its central matters since the everyday connections between administrators and academics help strengthen the steering capability and university income legitimacy is responsible by both stated actors. The balance between them is needed for the university to prevent the educational value ignorance by administrators and the obsession with old interest among academics (Clark, 2004a).

The stimulated academic heartland

Academic heartland represents academic departments which covers research, teaching and basic units where academic work is produced. The academic departments combine both new and old disciplines and fields of study and some of them are interdisciplinary. An entrepreneurial university has academic departments which are flexible to changes in values and beliefs. Academic heartland is the next element to be considered after an entrepreneurial university develops its managerial capacity and its strong connection with outside organizations and groups as well as diversifies its source of income. According to Clark, it is difficult for entrepreneurial spirit to be instilled in this element because the academic departments normally contain strong old values of the university. Clark states that it is challenging for a university to bring changes and innovation into academic heartland and often, the university is not successful in doing it. This is why the acceptance and opposition that happens within this element is essential. For a successful case, it requires a department and faculty to be transformed as an entrepreneurial unit and increasingly connect to its external income providers by providing knowledge through new programs. The academic departments' staffs are required to join central steering groups and accept the stronger power of the university managers spread from the centre, department and research centre respectively. The work of Clark in 2004 about University of Makerere in Uganda shaded some light on the initiative role of social science and humanities departments in stimulating entrepreneurial academic heartland. Those departments discover sources of income even before science and technology departments which are generally the first places for the emergence of the entrepreneurial spirit. Clark also added that the pool of income generated from all types of departments supplies the entire university is another issue for university to distribute the shares to departments (Clark, 1998a, 2004b).

The integrated entrepreneurial culture

The integrated entrepreneurial culture represents the existing entrepreneurial ideas or culture within a university. This element represents values or beliefs which can lead or happen after the other elements in the university transformation. Clark mention that an entrepreneurial university behaves in similar ways as high tech industry companies with is open up to changes. Creating the entrepreneurial culture within the university may start from developing small changing ideas to a set of beliefs and embedded it in academic departments. To see whether the culture is strongly embedded within the university or not, one can notice the strong practices. Institutional identity and its unique reputation will be cultivated once the university has its culture and symbol which emerged from the interaction between ideas and practices. Clark, as stated in his work 2004, universities with high intensity of entrepreneurial culture are seen with high capability in adapting to changes in their settings, bringing changes to the institutions and maintaining high competitiveness for reputation among their staff (Clark, 1998a, 2004b).

5.2.2 Rationale for using Clark's framework

Considering that Clark introduced these concepts in his work “Pathways of Transformation of five European universities” which was developed from European higher education context, the researcher provides rationalities in choosing the framework to justify the fitness of the purpose of the framework used in this research. First, Burton Clark is a well known scholar in higher education research field whose work has been claimed as the first discussing about entrepreneurial university (C. Reyes, 2016). The developed theoretical framework, therefore have been discussed further among higher education researchers about entrepreneurship in higher education. Second, the flexible idea of Clark on the development of his framework and the emergence of five share values from different higher education contexts (The UK, Sweden, Finland, and The Netherlands) make it is convincing that the framework can be used in Thai higher Education context. Clark (1998) stated that “In the domain of universities, theory cannot aim for exacting one-size-fits-all. But we can aim for explanatory categories that stretch across a set of institutions, which, at the same time, do not do violence to institutional peculiarities”(Clark, 1998a). This can be implied that Clark believes in differences between institutions; even each university in European context has its own peculiarities. Theory cannot fit all university therefore explanatory work on case studies which is harmless to the uniqueness of each

institution is expected to explain behaviors of a group of institutions. He did not mean to shape the entrepreneurial university but to analyze what are the shared features among the case studies and how they transformed themselves in their changing environment.

Third, Clark's framework provides five sufficient and relevant essential elements for the analysis of the existence of entrepreneurial university elements within KMUTT. Despite the case study institution does not present itself as an entrepreneurial university, the diversified funding bases and the strong reputation on university-Industry linkages of the university have already implied the relevance of some of elements in the framework to the purpose of the research. Moreover, compared Clark's concepts to other existing frameworks, Clark's framework emerged from his focuses on the university-environment relationship and university transformation process rather than the intention to measure performance or guide the creation of the type of university (Clark, 1998a). Clark's framework, therefore, is relevant to the research question of this thesis which is "How has KMUTT been operated as entrepreneurial university?". Fourth, the dynamics of changes in Thai higher education context is somehow similar to European continent especially the United Kingdom. Therefore, the author considers using frameworks based on the context of European continent and the United Kingdom. After analyzing seven European national reports, Williams and Kiraev (2005) identified five main drivers of entrepreneurship in higher education institutions including ideology, expansion, globalization, the knowledge society, and financial stringency (Williams & Kiraev, 2005). In terms of ideology, the authors include obvious cases of state supervision including former Soviet Unions, some OECD countries such as Australia, New Zealand and the Netherlands as well as United Kingdom. These countries have experienced the changed political climate and prepared for the idea of knowledge society. Thailand higher education has also shared common features with western countries especially, United Kingdom, Australia and New Zealand. As stated by Sae Lao (2013), Thailand policy makers actively used "cross-national borrowing" during the policy formulation and agenda setting process. There were different study visits to learn from other countries especially those who pioneered Quality Assurance (QA) initiatives and NPM such as the United Kingdom, New Zealand and Australia (Sae-Lao, 2013). Sae Lao (2013) stated that National Education Act of 1999 as well as 2002 was a package of global models of education reforms which included decentralization and therefore, it helped to introduce the NPM (Sae-Lao, 2013). The freedom in its finance and budget after receiving autonomy led the universities to become more entrepreneurial (Rungfamai, 2011). The

other four main drivers of entrepreneurship in higher education institutions including expansion, globalization, the knowledge society, and financial stringency have existed in Thai higher education (as explained in Chapter 3). In this research assumes that KMUTT behaves as an entrepreneurial university because of the effort to adapt to changes in university environment such as autonomous status and New Public management which are influenced by Asian financial crisis in 1997' as well as "the culture of borrowing" in Thai higher education. Considering that Clark's work emerged from the study of entrepreneurial university behaviors of five university case studies which experienced changes in state roles including state budget cuts in most of the case institutions and NPM policy of the Thatcher government during the 1980s towards greater entrepreneurial spirit in the United Kingdom (Clark, 1998a; Etzkowitz et al., 2000), Thai higher education seems to share some common elements with European higher education. Therefore, Clark's framework appears to be a relevant framework to this research.

Fifth, despite, there are differences in terms of the Thai context and European context including the level of NPM. The use of Clark's framework is not seen as a harmful or irrelevant framework to Thai context. Instead, the five element provided by Clark are seen as lens to look at the Thai higher education context and will only be used to analyze whether the university shares entrepreneurial university elements including the area of funding, steering core, academics, relationship with external organizations and institutional culture. The researcher is supposed to be aware of the cultural context differences and provide rational arguments to support the explanatory in the case analysis in Chapter 6.

5.3 Data Collection

This study aims to seek for sufficient and relevant information to analyze entrepreneurial elements. There are two types of data to be collected: primary data and secondary data. Primary data is from interview transcript of twelve interviews and secondary data is from additional documents received from KMUTT. The author contacted the university central administration providing the research questions and asking permission for conducting the study. A research proposal and an interview guide were sent to KMUTT for the university to understand the purpose and the scope of this thesis study. The author follows the theory-guided analysis which is seen as one of the key elements of qualitative content analysis (Kohlbacher, 2006). According to Kohlbacher (2006), the procedure shared the same focus as case study research that the

researcher consistently compares theory and data. This method also allows the comparison between the primary data and secondary data collected which ultimately guarantees the quality of the analysis, especially validity. Therefore, the author constantly rechecked the link between theory and data as well as sent a fill in document to the university central office to get university facts such as numbers of collaborating projects and etc.

Semi- structured interview is used as primary data source to collect data based on Clark’s analytical framework. This type of interview helps the author accesses the most updated information and explore all possible issues related to the research topic as well as at the same time receives enough data to analyze the case study. Key ideas were extracted from Clark’s five descriptive concepts before they were used as a guideline for interview questions design. There were twelve interviews of university top management and academics. All interviews were arranged one on one through Skype phone calls. Each interview took forty minutes to one hour to complete. After interviews, the author transcribed all interviews in Thai and then, translated them into English. The author received an approval from KMUTT to interview a group of KMUTT university policy makers and academics (See table 4).

Table 4 KMUTT interviewee profile

Positions
University president
Vice president for finance and property
Assistant to the president for innovation and partnerships
Senior director for the office of the KMUTT president office
Acting senior vice president for research and innovation
Senior advisor for science and technology policy institute in KMUTT
Vice president for industry and collaborations
Director for planning division/ acting leader for policy innovation center
Academic : head of a department of faculty of engineering
Academic : associate dean of faculty of science
Academic
Academic

However, the questions developed from Clark’s elements were asked and emphasized differently on different actors on the basis of their expertise (See Table 5). The university checked the interview guide and identified the possible interviewees who have abilities to especially answer the questions. For example, the university vice president for finance and property was suggested to be asked specifically about university funding policy and the university vice president for research and innovation was suggested to be asked about external collaborations. However, all questions in the interview guide required all interviews to answer.

Table 5 The different interview question emphasis among interviewees

Actors	University executives and administrators	Academics
Strengthen Steering Core	X	
Expanded Periphery	X	X
Funding	X	
Academic Heartland	X	X
Integrated Culture	X	X

The data collected from interviews are kept in both print and voice records. The author identified and described patterns and themes from the perspective of the participants, then tried to understand and explained the coherent between the university behaviors and entrepreneurial elements. Moreover, the author involved the informants to check the collected data such as the dialogue record and its interpretation (Member checking). Documents from KMUTT and other related documents were used as secondary data source. The content in the past and in general was done through document analysis. The approach focused on using questions, data collection bases on the participants’ involvement. The analysis of the data was built from specific elements before being broadened to bigger themes as well as interpreted by the author.

5.4 Analysis

The primary data and secondary data are analyzed through the lens of entrepreneurial university analytical framework suggested by Burton Clark. The result will be presented in descriptive form. The ultimate research procedure is writing a flexible structure report. The author use Clark's framework and concepts of entrepreneurial university in the analysis chapter to structure the conclusion from interview transcript and document analysis as well as analyze the development of KMUTT five entrepreneurial university elements. In this study, the author uses KMUTT as a case study. The author collected data and provided in depth analysis of the research by applying the deductive form of qualitative content analysis. According to Mayring (2000), the deductive category application is one of qualitative content analysis procedures which provides systematic ways of coding by determining and assigning category to a passage of text (Mayring, 2000) (See figure 5). The author identified research question and the goal of the research. Later, the author provided the main categories and sub categories formulated from entrepreneurial university concept developed by Burton Clark. The author, then, collected, analyzed and arranged data following the categories. During the analysis process, the author kept updating and revising the categories and coding agenda to recheck the coherence between research question and the analysis as well as to assure the reliability of the research.

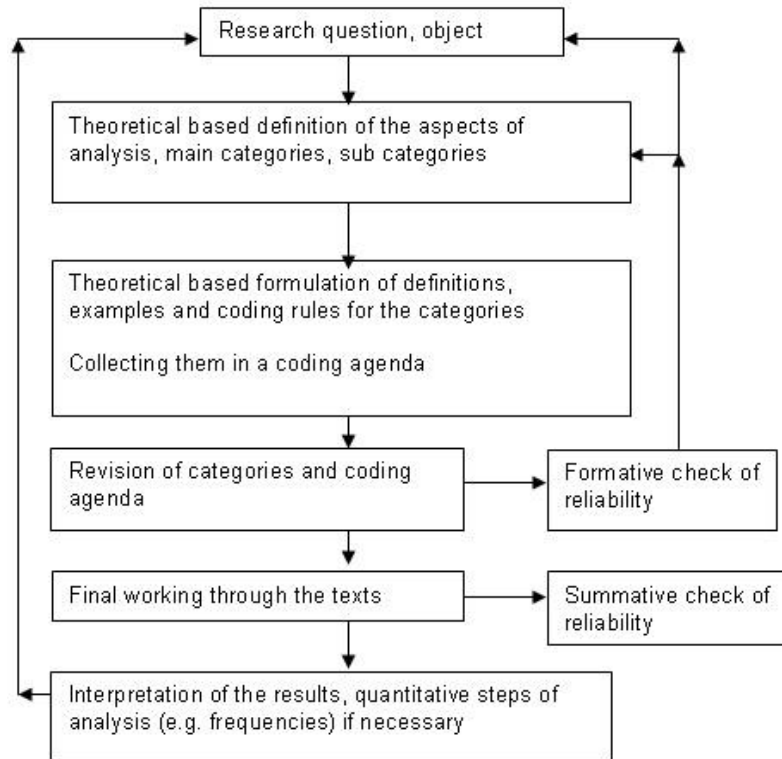


Figure 5 Deductive Category of Application. Source: Mayring (2000)

The author maintains the role as a primary and secondary data collector and analyst. The fact that the researcher is a Thai and earned a bachelor’s degree in Thailand make the researcher as an outsider of KMUTT who experiences Thai culture and Thai higher education. There is also no bias from the author since there is no relationship between the author and the university.

5.5 Ethical Considerations

As mentioned by Creswell (2007), the researcher is required to respect the rights, needs, values and desires of the informants (Creswell & Clark, 2007). In order to protect the rights of the informants, the author gives clear explanation verbally and in print about how the research will be conducted. Any sensitive information which might affect the persons negatively will not be revealed. The name of each interviewee will be omitted, replaced with coding numbers and sorted out without considering the order of their positions e.g. Interviewee one, two and three.

5.6 Validity and Reliability

Research validity tells to what extent the research provides accurate results and precise measurement to the research question (Golafshani, 2003). In terms of validity of this research,

the author used entrepreneurial university concept developed by Burton Clark as the basis of the study to provide a strong frame for the research. The chosen of the theoretical framework was based on strong rationality regarding the fitness to Thai higher education. The author gained deeper understanding of the meaning of the theoretical framework used and provided the key ideas before choosing and collecting data. The author interviewed both university managers as well as academics to avoid bias and bring out the most truthful information from interviewees. Research reliability confirms the consistency of the research results throughout the research (Golafshani, 2003). In terms of the reliability of this research, the author used theory-guided analysis which involved the informants and interviewees to recheck the data collected from KMUTT to assure the correctness and the relevance of the information (Kohlbacher, 2006).

5.7 Limitation of the Research

There are few limitations needed to be mentioned for better future research regarding the study topic. First, the scope of this study was narrowed down due to the time limitation. Second, communication with the university was difficult due to long distance and time difference between Thailand and Finland. The researcher and informants communicated through distance communication such as emails and skype phone calls which sometimes caused delayed responses. In addition, time difference and limited accessibility to university policy makers made it inconvenient to arrange convenient times for interviews. Moreover, with the only one case study, the generalizability and transferability must be taken into account, as the findings might not be transferable to the context of Thai public universities in general. Since most of Thai public universities are not autonomous, they do not have full authority to manage their income and full right to exercise their managerial power. Therefore, they are not able to diversify their sources of income and establish and extend their internal units freely to the same extent as KMUTT which is an autonomous university. The results of this study can be best transferable and applicable to Thai autonomous research universities, especially those in science and technology education. For this research results to be generalizable to greater extent in Thai higher education, the author suggests future research to do more empirical studies about Thai autonomous research universities.

Chapter 6 Analysis

KMUTT is considered by its staff as a science technology and innovation university, innovative university, research university, autonomous university and medium size university. KMUTT perceives its character as innovative and supportive to the development of society and economy. According to the interviews, KMUTT main identities are practical students, highest connections with industrial sectors, high flexibility with private sector, long continuing administrative team as well as less internal conflicts compared to Thai universities in general. Recently, entrepreneurial university has seen as an emerging KMUTT identity. This part of research provides the analysis of KMUTT entrepreneurial university elements based on five elements in Clark's analytical framework about entrepreneurial university. The five elements will be arranged in the following orders: the diversified funding base, the extended periphery, the strengthened steering core, the academic heartland and the integrated culture.

6.1 The Diversified Funding Base

According to Clark (2004), entrepreneurial university is considered as “self-reliance” which is enhanced by diversifying its income channels. The author divided key ideas of the diversified funding base element explained by Clark's into diversified financial sources and internal budget allocations.

6.1.1 *Diversified financial sources*

Clark categorizes university funding channels into three main funding sources: the first stream income, the second stream income and the third stream income. The first stream income means state funding from direct authorized ministry. The second stream income (Research council funding) and the third stream income are other organized state government sources, private organized sources and university generated income. Private organized sources cover income from business firms, industrial firms and philanthropic foundations (non-governmental organization and foundations). University generated income includes endowment income, alumni fund raising, student tuition fee, income from campus operations (academic driven activities, spin-off activities, stand –alone activities and self-financing activities) and royalty

income from patented inventions and licensing of intellectual property (Clark, 2004b). By all means, the university maintains higher educational values than money offered.

KMUTT finance policy shows that the university has become more active in increasing funding channels apart from depending only on the first stream income or mainline support from government ministry as well as the second stream income or state research council. The university has depended more on third stream income including income from external organizations including business firms, industry and other public organizations. Moreover, the university has generated income from student tuition fee, endowment, alumni fund raising and income from campus operations and royalty income from patented inventions and licensing of intellectual property.

According to interviews, KMUTT has increasingly relied on three main financial sources including state funding, student tuition fee, and external collaboration services such as university industry collaboration service fee and educational service fee from private sector. Other small financial resources are from its investment. The university has set its financial target portion to be 1:1:1 which means the university expects to equally receive financial support from three main different funding channels including state, students and industry or private sector (See figure 6). An interviewee who is one of KMUTT university top management believes that with the strong university industry linkage, KMUTT can even receive one third of its funding from industry which is considered different in comparison to Thai universities in general.

“It is common in Thailand to have three sources of funding. We set the target to be 1:1:1 But, many universities focuses on 1st and 2nd type of funding. For us with the linkage with industry we can make 1/3 of our funding from industry.” (Interviewee four)

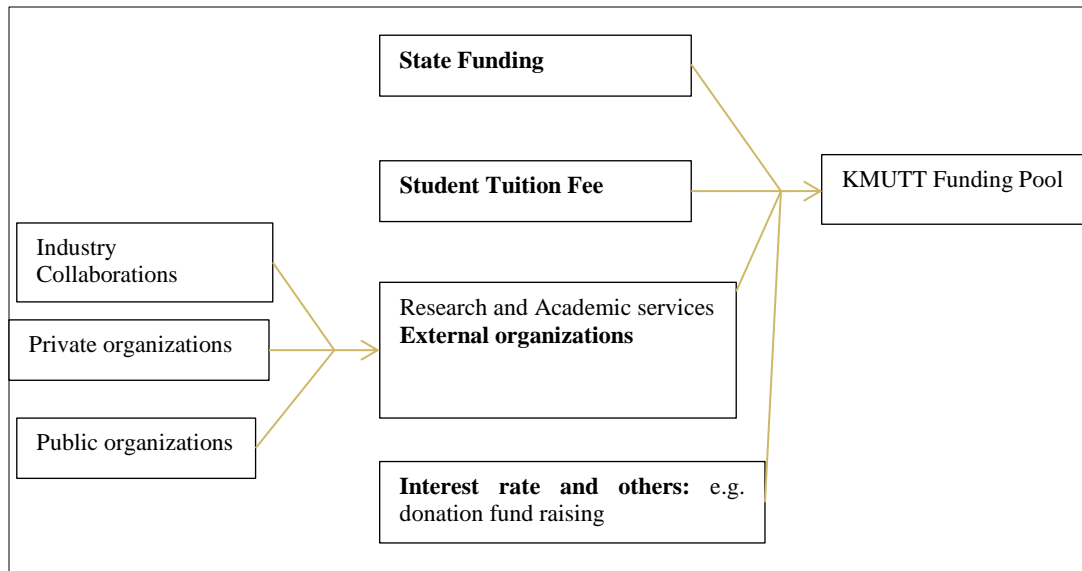


Figure 6 KMUTT Incomes (1: 1: 1 Policy). Source: Own depiction based on interviews

In spite of the fact that there has not been any state budget cuts policy, the stable annual university income from state relatively has proved the insufficient support to the demand of KMUTT. State funding has been insufficient and student tuition fee has been avoided not to be increased. Consequently, KMUTT has depended more on funding received from external organizations.

“We received similar amount of money from state each year. If we see it in the form of lum sum amount of money or dollars –the state funding is not reduced and the amount of money might be the same or even more when there is inflation. However, if we consider the portion/or weigh of the state funding in the whole pool of funding –the portion of state funding are reducing compared to other type of funding which means KMUTT depend less on state and depend more on other type of funding. We have to seek for more money from tuition fee, industry funding, and others. What we need each year is almost 4000 billion baht but we might receive only 1000 billion baht from state..... In the future, we might depend more on the 3rd stream income. If we can do it, I believe it will make us see the whole picture.....” (Interviewee four)

Despite the fact that the search for the third stream income is seen as the way for KMUTT to survive the changes and improve the university financial management, most of interviewees agree that KMUTT maintains higher educational values than just pursuing financial resources. The interviewees suggest that the purpose in sending students or academics out to support strategic partners is to cultivate new knowledge and enhance knowledge application. It is often

that KMUTT sends students and staff to support small budget SMEs because the university sees the support as opportunity for its human resources to put knowledge into use and cultivate new knowledge. Money is not the main purpose in collaborating with external organizations.

“Even it is true that part of our funding is from the state, we still think that we have to seek for other findings. However, the seeking for funding strategies has to follow the principle that KMUTT should get to use its academic knowledge in attracting money. It is very often that we support SMEs even though they don’t have much budget. But, we help them because we want to support our students and staff to cultivate knowledge from helping SMEs. Therefore, we might not gain much money and profits. It is not like that.” (Interviewee Three)

6.1.2 Internal budget allocations

Entrepreneurial university described by Clark has its capacity enhanced by effective internally cross-subsidizing which means taxing rich programs to aid less-fortunate programs. The university not only seeks to subsidize new activities but also enhance old valuable programs. According to an interviewee, KMUTT internal distribution of revenue relatively affects the demand in third stream university income and number of KMUTT students. KMUTT shows small obligation to cross-subsidize science and technology programs to support social sciences and humanity faculties since the university significantly has more portions of science and technology departments than social science and humanities program. KMUTT argued that the university distributes its budget to each faculty and department based on their future demands. KMUTT forecasts estimated university income and expense in advance before allocating its budget. Moreover, each university internal unit has flexibility to manage its own budget based on the university regulation framework and they can adjust the plan and budget if necessary (See figure 7).



Figure 7 KMUTT Budget Allocation. Source: KMUTT, 2017.

The strategy office is responsible for internal income distribution. Each university internal unit has to do annually operational plan and “budgeting 1+2” to submit to the strategy office. Then, the office collects and analyzes the plans as well as plans KMUTT annual operational and budgeting 1+2 strategy. In the meantime, the strategy office prepares and presents the 1+2 plan to KMUTT budgeting committee which university president sits as a chair person. Then, the plans will be sent to financial and asset committee and university council for approval. The budget planning is arranged before the annual fiscal year which starts from 1 October to 30 September each year. KMUTT allocates its budget to faculties, schools, computer center, library, learning institute, research institutes, academic service institute, industrial park center and the president office or central administration. KMUTT income distribution is on the basis of different types of income sources including government budget allocation, tuition and fees budget allocation and KMUTT research and academic services and interest and other income allocation.

State Budget Allocation

KMUTT divides its direct state funding for operation, research projects and capital budget. The budget from state, which is in the form of block grant, will be used as operation budget, while capital budget government is funded by line items. Operation cost from state budget if not include budget for investment is about 1 billion. KMUTT has similar budget amount of operating cost from state budget and student tuition fee. Part of the income from government is spent on research projects since the university has to commit to the collaborations with industry. KMUTT

can spend the research income in the overhead part following the university funding regulations which depends on the size of the projects. Generally, KMUTT cuts back 10% of its government budget for central university administration before distributing some of rest of the budget to each faculty bases on student numbers. Overhead from research and academic services will be allocated to the units that first come to propose the plans and based on the number and the size of the proposed projects (See figure 8).

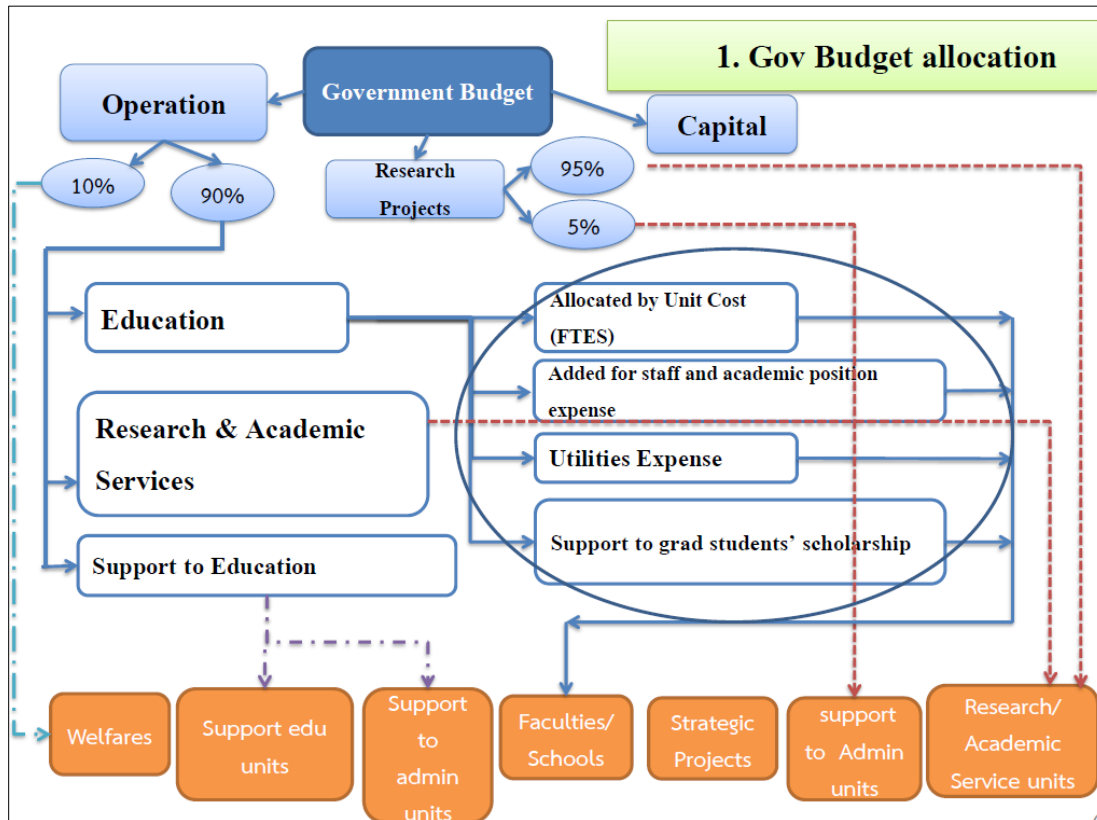


Figure 8 Government Budget Allocation. Source: KMUTT, 2017.

Tuition & Fees Budget Allocation

KMUTT divides its income from tuitions and fees for university administration, faculties and schools and student scholarships. This income is distributed to each faculty based on their numbers of students and responsibilities. Income from student tuition fee is distributed based on Full time equivalent student number (FTEs) since most of KMUTT faculties are science-oriented. The more the faculty teaches the more the faculty receives funding. There is also transfer cost to compensate for the resources of the faculty that handles costs from students from

other faculties. For example, if an engineering student studies with faculty of arts, the university should compensate for the expense that engineering students cause to the faculty of arts. Before KMUTT allocates income from Student Tuition & Fees to faculties, the university will cut back indirect cost approximately 60% of the budget to the university central administrative unit for administrative tasks since the university need to tax some money from every faculty to support the central administrative unit because the president office and human resources are cost centers that do not have their own income (See figure 9).

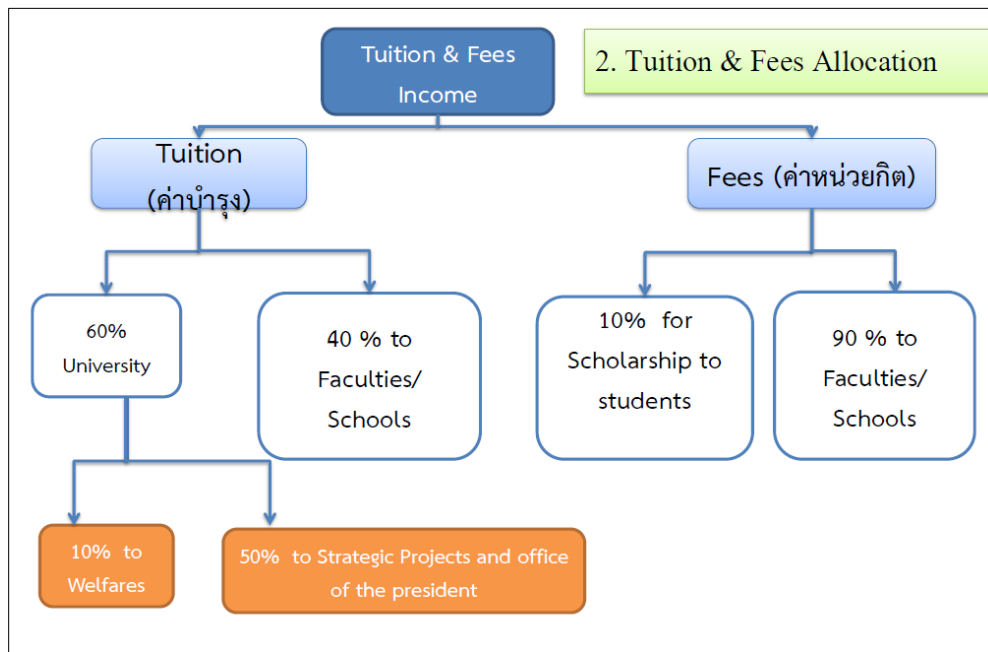


Figure 9 Tuition and Fees Budget Allocation. Source: KMUTT, 2017.

Research & Academic Services and other Budget Allocation

Apart from state direct funding and tuition and fees, KMUTT also uses income from external organization or research and academic services to support research administration at university level and distributes the rest of this type of income to faculties and research/academic units. Income from interest and other sources are invested and put in strategic projects (See figure 10).

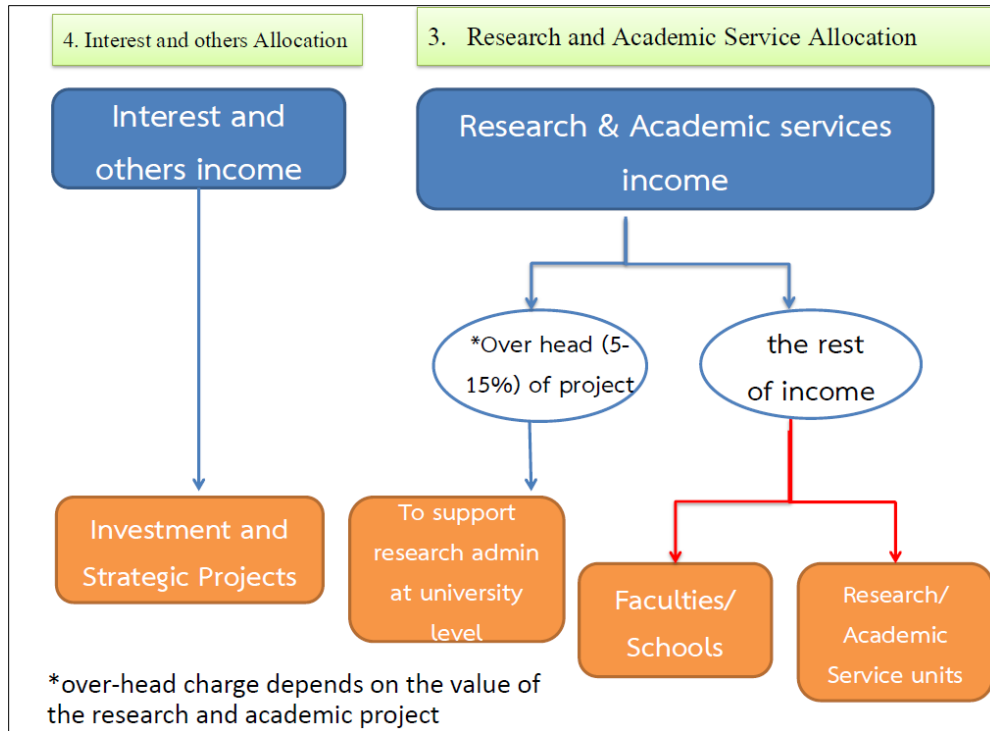


Figure 10 KMUTT Research and Academic Services and other Budget Allocation. Source: KMUTT, 2017.

KMUTT also has financial mechanisms to support faculties/schools in order to drive the strategic plan including FTERO (Full time equivalent research output) for research, WiL (Work-integrated Learning) for education and student development, ISOO (international strategic output outcome) for internationalization.

6.2 The Expanded Developmental Periphery

The developmental periphery means a university creates or extends units for better collaborations with external organizations (Clark, 1998a, 2004a). These units can be categorized into two groups including administrative offices and academic units. The units excellently work on knowledge transfer, industrial contact, intellectual property development, continuing education, fundraising, and even alumni affairs (Clark, 1998a, 2004a). Clark states that an entrepreneurial university supplements the existing traditional discipline-centered academic department with central units for better external collaborations which generally concentrates on multidisciplinary and transdisciplinary (B. R. Clark, 2004). The new units expand across the traditional academic units and involve academics in creating research groups or projects. They are capable of

generating income and work as a coordinator between the university and external organizations e.g. Science parks. For better understanding about the expanded developmental periphery, the analysis is divided into two sections: the university's character in reaching out to collaborate with external organizations and the outreach administrative and academic units for better external collaboration.

6.2.1 External organizations collaboration

KMUTT was established as a Science and Technology college in 1960. The main mission of the college was to train technicians, technical instructors and technologists for industry. In 1974, KMUTT transformed its status from college to university. Even through the university has been transformed from a state owned university to be an autonomous university and research university, all interviewees agree that the university mission in producing graduates to support external organizations especially industry has never been changed until present. At the early stage, KMUTT focused on teaching and learning mission that the institution educated graduates and sent them to support industry. The university has always focused on practice oriented education and production of professionals and engineers. Later on, the university has become more research focused that it continuously integrated scientific research projects in its teaching and learning which have been carried on by the university academics and students aiming best at successful knowledge application. Graduate schools were established to enhance the research focused activities. Since 2014, KMUTT has become more strongly committed to adding values to Thai economy. The university heavily mentioned a lot about innovation and how to produce better research which is relevant to the demand and strategies of Thailand.

“At the beginning, we focused on practices and produced professionals and engineers. At the middle, we become more focused on research. We established a graduate school for specific disciplines such as energy, biotech and etc. How KMUTT produced graduates was still the same rather changed slightly the duration of study from five year study focusing on practices in the first year to be like other university which has 4 year study program. KMUTT has “Practice Oriented Education” and “Scientific Research”. Later on, not long ago lately 3 years ago we have strongly committed to help contribute by helping Thailand add values to Thai economy. We, therefore, have started mentioning a lot about innovation and how to better produce research which is relevant to the demand and strategies of our nation. We are now during this transition.”
(Interviewee one)

KMUTT has worked with public and private organizations, industry, companies, marginalized communities, royal initiative projects and local communities. Collaboration activities covers contract research, contract education, consultancy, knowledge transfer, industrial contract, intellectual property development, continuing education, fundraising and even alumni affairs (See more activities in Appendix C). The university focuses on KMUTT practice school where students are educated under “work integrated learning” principle. The university aims to apply the learning style to all students programs and has signed many contracts with its partners. Students at bachelors and master’s degree levels are sent out to help companies, industries, marginalized communities, royal initiative projects and local communities. Moreover, KMUTT university firm collaborations are mostly in the form of contract research. KMUTT provides solutions and consultancy for companies. The university has created the work mechanism to make university research relevant to partners’ demands, especially big companies. Meetings are arranged for KMUTT and its external stakeholders to mutually identify and match research problems with KMUTT academics’ expertise. Academics are also encouraged to visit companies or factories to develop solutions, R&D or research topics. This opens up opportunities for some academics to help the companies to train their employees.

The active connections of KMUTT university administrative and academics with external collaborations is considered as a part of KMUTT organizational culture which happens to all departments and faculties at all levels. The objectives in building connections with external organizations are various depending on the types of external organizations. However, all interviewees agree that the main goal in collaborating is to improve KMUTT graduate quality. According to the interviews, the stronger linkages between KMUTT and external organizations are as a result of the need to survive changes and strengthen its reputation as well as the university close connection with state. Some interviewees argue that the expanding connections between KMUTT and external organizations and the survival of KMUTT are inseparable. It is impossible in Thai higher education context that the development will happen without university effort in reaching out for external support. KMUTT needs to collaborate to access funding and resources. Some interviewees believe that it is the work condition in higher education in Thailand that any projects will not happen if the university waits for state support. The university will not be able to continue its research mission and focus only teaching and learning mission if the university gives up on pursuing resources.

“I believe that university survival and the expanding connections with external organizations are the same stories. If we don’t do anything for resources, we will not be able to get to work. It is impossible in Thai higher education context and it has happened to many Thai universities even KMUTT. When we encourage people to start projects, they will say that it is unworkable because the lack of funding to access resources. And, finally there is no work done. In contrast, it would be possible if we start to discuss about projects and slowly continue tasks right away.... There is a limitation in our national context, but if we focus on that limitation all the projects will be impossible. We should find the opportunities and directions. The ways we do it is by starting working and then, continuously seeking for resources through external collaborations”. I think we have been taught like this and have grown through this ideology.” (Interviewee Seven)

State plays key roles in enhancing KMUTT university industry mission. KMUTT implement its university missions suggested by Thai government in its science technology and innovation context by collaborating with industry. Some interviewees believes that the close connection between the current university president and the Institute for the Promotion of Teaching Science and technology (IPST) which is a public organization enhances the university effectiveness in collaborating with external organizations.

The reaching out to external organizations is not considered as a new mission or part of university transformation to KMUTT. The university- industry linkages as well as connections with private and public organizations have been instilling in KMUTT mission since its establishment. Therefore, such extended periphery to link with external organizations cannot be only seen as a way to achieve entrepreneurial university concept but rather it is to enhance the university industry linkage identity which has long been KMUTT culture.

6.2.2 KMUTT outreach administrative units

KMUTT has administrative units to enhance collaborations with external organizations such as Institute for Scientific and Technology Research and Services (ISTRS), Research, Innovation and Partnerships Office (RIPO), Scientific and Technological Research and Services institute, Industrial resource office, alumni funding, continuing education and etc. These units have facilitated academics and departments in collaborating with external organizations under the name and resources of university (See figure 11). The academics have no longer privately accepted work from external organizations without the university president’s signature on the contracts. They have to collaborate through the administrative units. KMUTT also has mediating

units such as an industrial park, Knowledge Exchange (KX) building and Bangkhuntian pilot plants as platform for research, innovation and entrepreneurship collaborations.

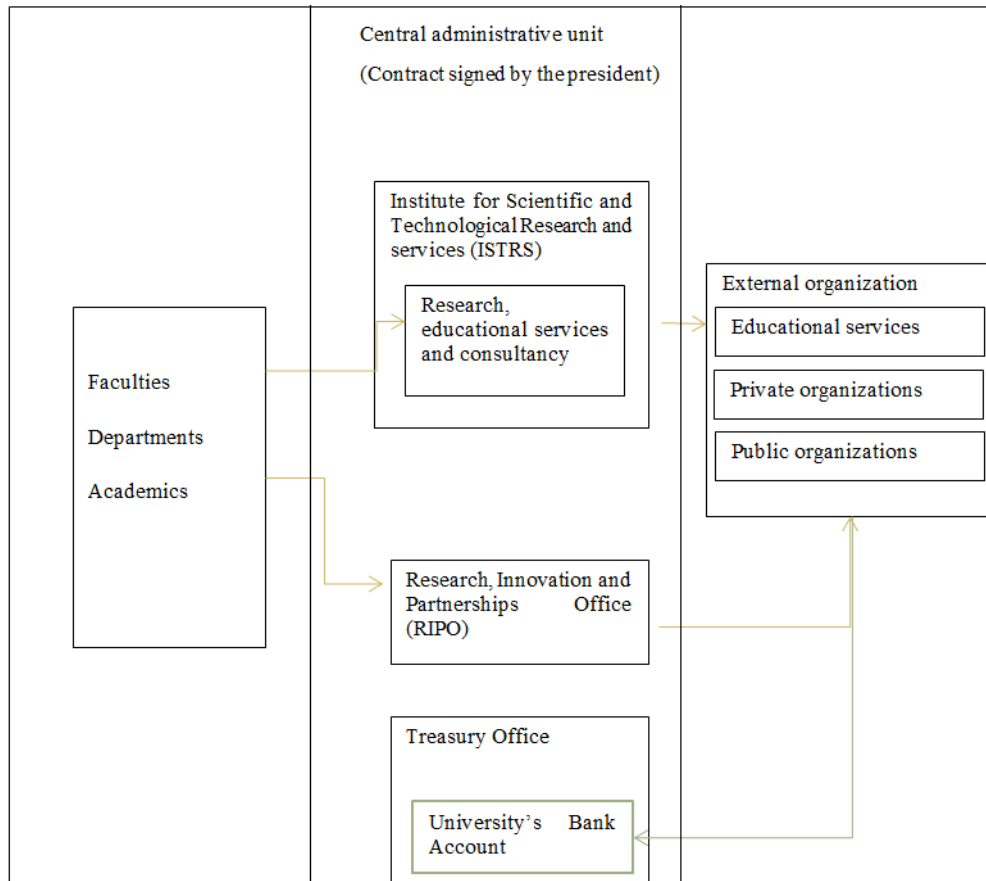


Figure 11 Internal Outreach Administrative Units. Source: Own depiction after interviews.

Since 1981, ISTRS has acted as KMUTT back office responsible for university-industry collaboration agility. The office is a central administrative unit which is responsible for research, educational services, testing, analyzing and consulting. This office supports collaboration between academics and external organizations. The office also collaborates closely with a legal office for research contract, project revenue and expense covering collaboration with international organizations. RIPO has recently emerged to be the second main outreach unit which is also a central unit under president office and under supervision of the senior vice president for research and innovation. The office is responsible for all research projects especially collaborations at the faculty level. The operation of RIPO is still at the outset. The office's research promotion function covered only the announcement about research grants and contracts. At present, KMUTT divides the office responsibility into research strategies and

communication to package research projects and manage the university research themes and focuses.

“The latest changes we had happened in top management office (president office). We have adjusted functions and internal units a lot in the area of central administrative unit. As I told you about our research strategies that in the past, research promotion covers only about research grants and research grant contract announcements. Nowadays, we divide the office responsibility into three parts: Research strategies and communication because we have to package research projects and manage our focuses and themes of university research.” (Interviewee one)

Scientific and technological research and services institute emphasizes on academic services and research contracts. The office supervises specialized service units of academics who are strong in logistics, welding and etc. Industrial resource office is another administrative office which also maintains research contract and works with other small companies. KMUTT staff research income is no longer pursued individually without research focuses and themes. To access funding sources, especially big funding, KMUTT staff compulsory collaborate and integrate with other disciplines. KMUTT increasingly emphasizes on research strategy and research project result communication. Incomes generated under supervision of these administrative units are transferred to treasury office to KMUTT main funding pool and to be further distributed to faculty and academics.

Pilot plants located in KMUTT Bangkhuntian campus provides facilities for industry to test their process and pilot production especially food industry. Lately, KMUTT established a bio-pharmaceutical pilot plant for medicine and vaccine production which helps KMUTT achieve international production standards such as Green room and Bio safety. These pilot plants attract private sector to collaborate with the university. Moreover, KMUTT established industrial park 20 years ago as a state initiative. The inconsistent funding from state made the park activities sluggish. However, the university has proposed a plan to Thai government to introduce the park as a part of Thailand’s national science park established by National Science and Technology Development Agency.

In 2011, KMUTT established “Knowledge exchange” or KX as an open innovation platform and innovation ecosystem that helps engage KMUTT with lots of industry and companies. It is a 20 stories building in the heart of Bangkok. Some interviewees consider KX as one of the most important units to interact with external stakeholders. The university earns income from charging

KX membership fee from industry and companies. Those big companies join KX with the purpose to support smaller companies like SMEs to boost up quality, productivity and innovation of those who are in their supply chains. KX performs as a space to arrange meetings or forums for big companies and SMEs to exchange their experiences which will finally lead to innovation and product development. KX is also a one stop service which provides services such as business consultancy and financial support to companies especially SMEs. For example, KMUTT advises SMEs about state regulations and mechanisms, 300% taxes, intellectual property and the accessibility to KMUTT academics and university facilities. Moreover, the university supports companies on talent mobility, a state initiative to promote the support of KMUTT academics to companies. This makes the university considers KX as a state focal point for talent mobility. Within the building, there are some financial institutions registered as KMUTT members to provide financial support to companies. Another key element of this platform is startups space and co working space where students and academics can establish their startups and collaborates with external organizations. The university is also opened up for outsiders who are interested to learn about startups. The platform also facilitates innovation contests and pitching activities for venture capitalists or bigger companies to sponsor startups. In general, the university has supported a few startups, experimental labs and university spinoffs as well as established a foundation and funding unit to help those startups succeed.

According to Clark (1998), outreach administrative units interact and link up university and external stakeholders (Clark, 1998a). The units process information and facilitate the collaborations between internal and external groups. They enhance the capacity of the university by responding quickly and flexibly to the demands of its setting. In comparison to the faculties and academic departments, the units are more initiative and flexible.

The establishment and the extension of outreach units seem to be seen positively among some academics. Some academics agree that the units help gather necessary information and connect university with external organization. KMUTT has significantly developed its performance to be more effective and flexible than before. However, some developments are still at the early stage and the new policies still require good implementation and better internal communication. In contrast to Clark's concept about flexible and responsive outreach administrative units' features, KMUTT outreach units are described by some interviewees as passive, routine and not proactive.

The outreach administrative units are criticized about their small impact on university collaborations. A few interviewees stated that they are not satisfied with the units' performance and convinced that those units need some improvements.

“They have helped us just a little. I think they need to be improved. I would say they are not proactive enough to reach out to new external organizations. Since today's world is the world of internet, external organizations mostly contact directly to academics and researchers. This makes the outreach administrative units become more like optional communicative channels. Those units are more like public relation department passing the news about funding from external organizations to us. Sometimes, we miss the news about some new funding and sometimes, we know about the source of funding even quicker than those administrative units”. (Interviewee five)

Some interviewees stated that there are redundant responsibilities among the outreach units that confuses academics about to which units they are supposed to contact for support. Moreover, the units are questioned by the interviewees about the effective communications between each unit, the units' understanding about the whole picture of KMUTT operating system and the knowledge about KMUTT researchers' expertise.

“There is irrelevant work between units and the support between units is not driven well enough. I understand that the university has delegated some work to Vice presidents but, I do not think that the subordinates understand their given tasks. Although we recruit new people, the new generation of staff both academics and officers just follow the old staff and do things in routine ways.” (Interviewee six)

“The units might not know what the research area we are working on because there are various field of study. I don't know if the units have information about what the research area KMUTT researchers are specialized so that they can be more active and helping us builds the connection with external collaborations.” (Interviewee five)

Some interviewees agree on the importance of the outreach units to have knowledge and information about academics' and researchers' expertise in order to boost up the university's capacity by effectively matching the KMUTT staff profile with the demands of the external organizations as well as quickly facilitating the collaborations. It was claimed by an interviewee that the ineffective interactions between academics and the units have occasionally caused the delay of research project progress and the difficulty to academics' university income generation.

“Although we have outreach administrative units such as pilot plant and KX, there are some potential researches and projects buried and hidden in many departments. This means the university loses its opportunity. “How can we commercialize our products if we do not know where to match our project with and what we have in our hands. I am not sure if they know KMUTT academics’ and researchers expertise to match us with the demands of outsiders. In my opinion, if there is a new research funding, the units are supposed to know to whom they can contact and inform about funding. Sometimes, we have to delay our research progress for 2-3 months just because the unit does not know to which university’s bank account the project funding should go through or the unit cannot advise academics on some crucial legal issues about collaborations.” (Interviewee five)

The clear responsibilities between KMUTT administrative units and teaching are not widely recognized within the units and other internal stakeholders. Drafting document and feeding information about collaborations to the units are seen as additional work burdens for some academics.

“The units require academics to feed information. If we do not feed them information about collaboration they will not know anything about what’s going on among academics and collaborations. Sometimes it is our roles in linking our existing partners with those central units to create MOU. We have to feed information about our partners and draft documents for the units instead of focusing on our core duties.” (Interviewee five)

Moreover, in contrast to Clark’s, not all KMUTT outreach administrative units are flexible to initiate and disband. Some interviewees agree that Industrial Park, Research center, KX and Social lab which require long term planning and high investment are not easy to be created or canceled.

6.3 The Strengthened Steering Core

The strengthened steering core is a greater managerial capacity which helps the university to become quicker, more flexible and more focused to the changes. This element embraces central university managers and academic departments as well as make the new managerial idea compatible with the existing traditional values of the universities (Clark, 1998a). The author provides an in-depth analysis about the strengthen steering core of KMUTT by dividing Clark’s (1998) descriptive concept into four key ideas including change and income oriented administrators, a flexible, effective and adaptive university managerial structure, a power balance

between top, middle and lower level management and collegial connections between academics and administrators

6.3.1 Change and income oriented administrators

Entrepreneurial university is driven by change-oriented and risk taking mindset as entrepreneurial university managerial group's characters. Apart from university executives and deans, the head of departments, development officers, technology transfer experts, finance officials and staff managers actively bring changes and income (Clark, 1998a).

Most interviewees stated that KMUTT staff especially those in top management take pioneer spirit as their pride. The university has always been eager to be the first among science and technology universities in establishing new units such as a graduate school, an industrial park, a pilot science within the university and a practice school. The idea has been guiding KMUTT administrators and managers to educate students and produce work which is the most relevant to the need of national demands. An interviewee also claims that the increasing focus on research and innovation are currently seen by the institution as the ways to make KMUTT a university which is most relevant to the demands.

“As I have heard from KMUTT staff, KMUTT people are proud of the institution pioneering spirit. KMUTT is proud to be the first in establishing new units such as the establishment of graduate school, industrial park, pilot science within the university or practice school – Work integrated learning. I think it has long been the principle of KMUTT that KMUTT has to benefit the society and economy by applying theories into practices. The change is the fact that KMUTT has emphasized more about innovation and research which are more relevant to the demands.”
(Interviewee one)

Some interviewees state that most of KMUTT university administrators are change oriented. KMUTT university administrators actively seek for patrons or new infrastructure units that link up with the outside especially industrial firms for the university. The key factors which identify KMUTT administrators as change oriented mindset is that to bring changes and income to enhance the university mission are seen as part of their careers. However, an interviewee states that the KMUTT top executive team includes those who are open up to new ideas for changes as well as those who believe in conservative ways of doing things. Some interviewees suggest that KMUTT enhances the change oriented mindset through the recruiting channels that similar

change oriented university staff and academics will create higher opportunity for those change oriented mindset to be in the leading university administrative positions at all level.

“Being a change-oriented person is an individual matter. However, it is a must that the mindset of the teams should go in the same direction. We can find those similar mindset people through recruitment process. For example, the faculty staff will select persons who is ready to bring changes and capable in managing the faculty. The candidates have to present their future administrative plans before being selected”. (Interviewee ten)

Most of the interviewees agree that the close relationship between some ministries and its top executives benefits the university in change implementation. In order to adapt to changes in its environment or go through any higher education reforms, KMUTT has strong support from state and its university top management. Some university executives were invited to work as a chairman for some ministries and came back to work for the university. The connections earned from working experiences with state later benefits KMUTT in terms of the close connection with Thai government.

“... We have never received any objections from university council regarding whatever KMUTT considers need to be solved or improved within university because the state understands the need for KMUTT to develop. The support is clear from KMUTT top management and university council. It is about mobilize internal support or how to encourage university staff and academics to bring university improvement that matter. However, I also understand that we university people are now working under constraint of teaching and research mission. We have helped each other in pushing KMUTT to move forward. Some people say that we do not move as fast as it is supposed to be but, I feel that we have done well enough.” (Interviewee seven)

6.3.2 Flexibility, effectiveness and adaptiveness of university managerial structure

In the context provides by Clark (2004), there are three patterns of university administrative structure. First, the university adjusts its university administrative structure to be in flat structure, disbands intermediate units and reduces the barriers between the center and base units. Second, the university increases administrative power and duties to the existing units emphasizing at central units, faculty and departments. Third, the university professionalizes all units especially the central units (B. Clark, 2004). KMUTT administrative structure matches with the second method of Clark's strengthened steering core.

An effort of KMUTT in improving its university administrative structure to be flexible, effective and adaptive can be seen through the adjusting university administrative structure. KMUTT has widened its administrative structure to collaborate and respond better to external organization needs. In 2014, new administrative positions including Senior Vice President has been added under the supervision of university president as well as vice president for research and innovation has been added under the supervision of the senior vice president to increase the effectiveness of university internal communication as well as external collaborations. The vice president supervises three main units including ISTRS, RIPO and Center on Industrial Instrument Calibration (See Figure 4.1 University Administrative Structure). All vice presidents have their full authority in their responsibilities while the university president is a standard bearer who mostly interacts with external stakeholders.

Moreover, KMUTT has significantly adjusted functions and internal units under the supervision of central administrative office, especially the research administrative units. Originally, university research mission only covered research funding and pre- post research contracts. Later on, the growing importance of innovation led KMUTT to combine innovation promotion units within industrial resource office, technology transfer office, high technology management, Entrepreneurship development, technology commercialization and RIPO.

Some KMUTT interviewees suggested that the higher flexibility in university administrative structure is due to the university autonomous status. The higher education development and the university autonomy in Thailand influence the decline in the top down management within Thai universities. Thai universities become much more decentralized when it is compared to other public organizations. KMUTT executives agree that KMUTT has university administrative team who tries to influence and build internal work mechanisms to enhance academic freedom. Therefore, the top down management is not as strong as KMUTT before it was granted autonomy. Instead, the university has developed more internal communication mechanisms to convince or suggest its personals the importance of any university developments, changes or strategies for the future. In addition, most interviewees link the flexibility of the university administrative system to the communication between lower management and the top management as well as the university staff mobility. The KMUTT administrative structure, overall, is considered as flexible that opinions from all administrative levels can be heard by the

board of the university. The ability of university staff and academics to make appointment and share opinions with university top management e.g. the university president as well as to be able to collaborate with external organizations such as industry and private organizations is considered as a flexibility of university administrative structure, especially when comparing KMUTT to other Thai public universities and public organizations in general.

“I think KMUTT has a flexible administrative structure because everyone can make a call to the university president and share ideas. I think it is not normal if we compare KMUTT to what it is like in others universities. I consider we are in a better situation compared to other universities. Others are in even worse situation. For example, our researchers are allowed to go out to work with industrial sectors while it is not possible in many universities. For example, some private universities might ask for our KMUTT researchers to work for them for 2 years. It is acceptable for our university but impossible in other institutions.” (Interviewee eight)

Although the university administrative structures have been changed to be more adaptive and flexible to the collaborations with university partners and the granted KMUTT autonomy helps the university establish or abolish units or departments, some interviewees stated that the level of flexibility has not been as high as expected due to state regulations and the university’s deep rooted bureaucracy. An interviewee states that there are some state regulations that prevent KMUTT to have full flexibility as it is supposed to be. Considering that KMUTT has been given autonomy, the university management has not been flexible as expected due to the deep rooted traditional university mindset within university and the university regulations which still subject to some state regulations e.g. state rules about financial regulations, university inventory, university procurement system, human resource recruitment, academic status proposal and educational act. In addition, the fact that KMUTT is still subject to Office of the Ombudsman and its university managers has to report their assets to Office of the Auditor General are considered as the unsatisfied inflexibility to university administrative management.

“The university administrative management is not quite flexible. We still got struck with some work mechanisms and state regulations. In my opinion, the university is not only inflexible but also not so agile and not so leaned. Namely, our financial regulations, inventory, investment and human resource recruitment...Instead of focusing on the effectiveness, KMUTT focuses on corruption prevention. The flexibility is not as high as it is supposed to be because we are still state-owned. We are still subject to Office of the Ombudsman Thailand, Office of the Auditor General of Thailand or the new coming topic “The report of administrative asset”. “We need to

have the same understanding that there are three types of university: Private, Public and autonomous public universities. Those who are totally impossible in that matter are those public universities but for us we can write our own regulations. So if you ask why the obstacle occurred, it is just because of us. We still cannot move out from state ways of doing thing. We have been under state control for 50 years and have just become autonomous. We still have that traditional mindset. It is not because we don't want to be autonomous but, it is because the state itself doesn't give freedom as it said. State still has its regulations. Recently, the state still regulates new rules about university procurement system. Even though we are autonomous, we still are subject to the educational act. We can draft what we want then pass it to government to consider. We still have some group of people who are bureaucrats within KMUTT which meant they do not change themselves to be civil servants that is why the regulations still affect us and also we have to change some of our regulations to make them relevant to the act. It is not flexible as it should have been and expected. (Interviewee eight)

Moreover, the higher flexibility and adaptiveness of the university managerial structure from the extended structure still have not raised enough effectiveness. Some interviewees pointed out that the policies and new initiatives are not implemented as well as expected due to the lack of understanding about the assigned tasks from the top management among the subordinating staff in the extended units even through the top management have distributed the responsibilities through the extended structure,.

"I understand that the university has delegated some work to vice presidents but, I do not think that the subordinates understand their assigned tasks.I agree that we have top management with impressive policies but, the policy implementation has not been done well enough. ...We should encourage our staff to be more proactivenot to work passively" (Interviewee six)

6.4.3 Power balance between top, middle and lower level management

In Clark's work published in 2004, he explained further that the administrative line is strong at all levels from top to bottom (Clark, 2004b). KMUTT demonstrates hierarchy of top management (university level), middle management (faculty level) and lower management (department level). According to the interviews, KMUTT still depends on the middle management or faculty level. Deans are expected to bring initiatives from central units to department level as well as push forward departments and academics' voices to top management. Some university executives have been aware of the importance of change oriented and respectful deans and heads of departments in convincing academics to follow the changes brought by

central unit. The university top management has given more power to its subordinating staff and at the same time granted greater collegial authority in surrounding committees as well as has decentralized its power to other administrative units.

“The most important thing is that the dean of faculty is being accepted among his departments. This would help convince academics to accept changes. University top management will not come down to see changes the department level. It is university administrative team to exercise the power, propose to the university council and bring change at department level.” (Interviewee one)

KMUTT has top down management has declined after receiving autonomous status. However, the power between top, middle and lower level management still appears imbalance. An interviewee suggests that while the university top management policies or new initiatives come from all management levels, people at the bottom of the university administrative structure could perceive the KMUTT administrative system as centralized since most of the decisions and decisions relating to guiding or moving forward the university mission such as innovation and entrepreneurship are the initiatives from university top management. The rapid changes pushed from the university executives make it is too difficult to follow by the lower level staff. Although the decision making process has designed to be decentralized that the decision making process involves staff from many levels, faculty departments are seen as the most problematic units for university transitions. An interviewee suggested that the fact that some head of departments are young and are promoted to be in the position because of their availability due to less work responsibilities gives them the artificial authority. These university lower level managers are afraid of making decisions and are not fully into the management of their academic departments. Some of them are too powerless to bring changes to the departments. Therefore, the bottom up administrative style does not work well at KMUTT department level. The interviewee believes that the department level problem is a common matter in Thai higher education context.

“The most difficult areas to bring changes are faculties and departments. They are very traditional. Some majors or departments might be found irrelevant nowadays. Or how they have been separated in the past still exists separated today even though they might be supposed to be merged. It is a culture which is difficult to overcome.”“We have changed university structures yes. But, the flexibility is another story. Although our university has received its autonomous status for almost 20 years and has enough capability to establish or abolish units or departments, the deep bureaucratic root make it not easy for the university.” .“Lower management people might see university administrative structure more “centralized” because

most of the decisions and decisions relating to guiding or moving forward the university mission such as innovation and entrepreneurship are the responsibility of university top management. Those people might understand that KMUTT university top management has led the university too fast to follow.” (Interviewee one)

A university executive mentioned that to enhance a power balance between top, middle and lower level management, KMUTT puts effort in improving internal communication. Monthly lunches are arranged for university top management including KMUTT president and vice presidents to meet and discuss with the head of departments. Dialogue communication and compromising and convincing strategies are considered as KMUTT communication culture that make KMUTT has less internal conflicts compared to other universities.

6.3.4 Collegial connections between academics and administrators

According to Clark (1998), the strengthened steering core appears to support decentralization of university central unit along with the collegial power between university central managerial groups and academic departments (Clark, 1998a, 2004b).

The dialogue communication, monthly lunches between top management and head of departments as well as culture of compromising show the effort of KMUTT top management in enhancing communication and collegial power between the university central management and other levels of management including department level. The KMUTT administrative structure is considered quite flexible since university top management does not extremely maintain its full authority in making decision. In order to introduce new KMUTT regulations, all units of the university including academics are encouraged to involve in university decision making process. According to KMUTT university executives, KMUTT academics have enough academic freedom regarding their assigned functions and power. The KMUTT university president rather has delegated power and projects to lower management in the form of financial support and approvals e.g. finance approval and human resource approval. In addition, the voices of academics are heard through academic council (See Figure 4.1 University Administrative Structure). KMUTT allows and encourages academics participation in university decision making process that the university governing board also includes academics. KMUTT promote “Flagships 6+1” to encourage KMUTT staff to share ideas on university important issues.

“To introduce new regulations to KMUTT community, everybody is encouraged to share their ideas. Therefore, I believe that the university top management is not only the group who has the power. For KMUTT, it is flexible. Although it is possible for our president to make full authority in making any decisions on any project approvals, he should also ask for advice from vice presidents, deans or those who have direct responsibility with the projects. I think that there are rare occasions that university top management made decision without involving academics or university staff.” (Interviewee four)

“If it is academic case, we let them have voices for sure. They can take care of their own career path. I think this question is difficult.” (Interviewee eight)

“We will have to try to encourage our academics to expose more to the outside world for them to acknowledge the new trends of changes or transformations. Very often that we invite experts to give speech at KMUTT.” (Interviewee one)

6.4 The Stimulated Academic Heartland

Academic heartland is the next element to be considered after an entrepreneurial university develops its managerial capacity and its strong connection with outside organizations and groups as well as diversifies its source of income. An entrepreneurial university has academic departments which are flexible to changes in values and beliefs. Clark is convinced that academic units including faculties and departments unevenly adopt and differently reacts to changes (Clark, 1998a, 2004b). According to Clark, it is difficult for entrepreneurial spirit to be instilled in this element because the academic departments normally contain strong old values of the university. The author provides in-depth analysis about this element by dividing Clark’s (1998) descriptive concept into three key ideas including administrative involvement, participation in income generating and collaboration with outside.

6.4.1 Administrative involvement

It is essential that the university core involves academics in its central matters since the everyday connections between administrators and academics help strengthen the steering capability and university income legitimacy is responsible by both stated actors. The balance between them is needed for the university to prevent the educational value ignorance by administrators and the obsession with old interest among academics (Clark, 2004a).

As stated previously in the strengthened steering core about the collegial connections between academics and administrators, most of the interviewees agree that KMUTT has allowed and encouraged academics to participate in university decision making process and developed mechanisms to bring all internal stakeholders to participate in guiding university directions for years. There are several work mechanisms that involves academics to share their ideas and opinions. First, the university governing board also includes academics. Within university administrative structure, “Academic council” includes academic representatives, university directors and deans. Second, KMUTT promote “6+1 Flagships” to encourage KMUTT staff to share ideas on university important issues. This forum was part of KMUTT 15 year roadmap. It is arranged occasionally for about 80 academics and our stakeholder representatives to involve in the essential flagships such as strategy, research, teaching and learning, etc. 6+1 Flagship program is also considered as an internal communication channel for KMUTT academic community and university management team to share opinions and acknowledge the direction of KMUTT. Third, KMUTT aims to leave future direction of university in the hands of young academics and university staff. Currently, KMUTT promotes the involvement of new generation (age not exceeded 45 years old) to plan KMUTT future university mission and main strategies through “20 year plan project”. After the plans are discussed among staff, it will be further discussed with KMUTT university top management team. In addition, the fact that some university staff have experience both administrative and academic roles is seen as academic involvement in administrative matters to a few interviewees. It is mentioned that most of KMUTT university managers at all levels are either promoted from academics position or simultaneously maintain both academics and university administrative roles to provide support for the top, middle and lower management level. For example, an academic works as an associate dean to occasionally facilitate the administrative management at faculty level.

6.4.2 Participation in income generating

KMUTT academics’ main responsibilities are divided into teaching, research, publications, academic services and seeking resources for university. These five missions of academics are evaluated in the staff annual performance document called “my evaluation”. Therefore, the income generation is seen as a compulsory part of academics’ careers. Entrepreneurship development has lately been promoted among KMUTT academics and students. The university

has supported academics to build on their knowledge and intellectual skills as well as to pursue research grants for them to upgrade their lab work to pre-commercial level. Currently, KMUTT has encouraged academics to apply for “state gap fund policy” and has already had eight projects funded by this type of funding.

Entrepreneurship development among KMUTT academics is still at the early stage. KMUTT executives still believe that there is a need to create entrepreneurship awareness among some academics. It is argued by some interviewees that some academics have increasingly put effort in bringing in external income for university. However, the levels of entrepreneurship and the income generating capability are various among different departments and faculties and depending on the demands from the university stakeholders as well as the availability of resources. Apart from seeing income generating as part of their careers, some academics need to strive for more income due to the insufficient funding received from the university and the need to aid other less-fortunate departments within the same faculty. The lack of undergraduate students in some departments reduces the opportunity of the departments to enjoy funding from student tuition fee as well as having less prospective graduate students to enhance the research production of the departments. Therefore, those departments will require more support from administrative management as well as actively seek for funding from other sources such as external collaboration. The lack of graduate students also indirectly increases the research work among academics in those departments.

“This part for academics is something we still have to work a lot more. They need to change their mindset and we need to build entrepreneurship awareness among them. We have not called ourselves as an entrepreneurial university because we have already received lots of criticisms already just we slightly mentioned about it. This idea is quite clear at University top management level.” (Interviewee one)

“There is uneven support from administrative management among faculties and departments. Some departments do not have any bachelor students to fulfill the existing graduate schools which mean they will not have enough resources such as student tuition fee and less budget from the university central administrative units. The scarce resource pushes academics to build connections with external organizations and do research which are supposed to be the responsibility of students.” (Interviewee five)

6.4.3 Collaboration with external organizations

Most of interviewees' states that it has as part of academics' careers to collaborate with external organizations have been a part of the university mission and supporting university in making connections with external organizations as well as generating income for university. Academics can work for external organizations under the approval from university. According to KMUTT executives, academics departments have their autonomy in planning for research or projects they want to focus on. The departments are able to propose their focused project plans and request for annual budget from KMUTT central unit.

However, departments are still considered the most difficult unit to be changes. There are lots of responsibilities in academics' hands. The work balance between five KMUTT academics' main responsibilities including teaching, research, publications, academic services and seeking resources for university are still vague. There is ongoing discussion about the effectiveness of existing performance measurement whether it is able to effectively evaluate how academics balance their duties. The existing staff's performance evaluation tool called. An interviewee stated that there is no incentive for academics to actively collaborate with external organizations except "my evaluation report" which is no longer suit the context of university. Most interviewees agreed that KMUTT academics' functions and the university still needs a clear incentive mechanism for academics to concentrate better on each of their functions. A KMUTT executive suggested that KMUTT ideally wants to categorize academics into teaching focused, research focused and service-focused. It is not about giving only one specific function to an academic. An academic should be able to teach, do research and provide services but might have different focuses. Some interviewees suggested that departments can support academics by discussing and balancing the share responsibilities among academics within departments. Research staff and academics might receive some compensation from project participation. One fourth of the money an academic receives through collaboration will be cut back to her original affiliation to compensate for time and resources which are supposed to be invested in the person's main duties.

"How KMUTT incentivize those academics to have their focuses on each of their functions is still being discussed at the moment and we have not made it clear. Ideally, we want to categorize academics into teaching focused, research focused and service-focused.We want to make it clear but it is still not clear." (Interviewee one)

A few interviewees stated that the difficulty in bringing changes to faculties or departments is due to the ineffective internal communication and the perception about university stability of academics. Some academics perceive KMUTT as an institution with high stability rather than one who strives for survival. Although some academics might have high egos and conservative ideas, they are willing to change for their university. They expect the university to enhance the internal communication, proactive policy implementation for all units and the academics' performance evaluation tool. To bring changes to the department level requires support from all levels not only from the head of departments. All units (e.g. administrative units, outreach administrative units, teaching and research unit) within the university combine both those who are conservative and change-oriented. To bring any changes to university, all internal stakeholders such as top management, deans, academics, general officers and head of departments, should involve in the scheme and be proactive.

An interviewee explains solutions to cope with resistance from “academic heartland” that by the nature of KMUTT and Thai culture, the university will not use “make or break” solution but, rather convince its staff and find other compromising alternatives. Even though the department or the academics' expertise are no longer relevant to the university mission, KMUTT will choose not to disband the department or to dismiss its staff but rather merge the department with others or create new projects for the staff to participate. Moreover, the KMUTT has university council as a proper authority which allows academic representatives and other stakeholders to process decision and guiding university direction based on democracy mechanisms. The resolutions made by council are considered as final agreement which academics should comply. Apart from following university council resolutions, convincing and respectful deans can relieve the resistance and bring changes to the faculty and departments. The university administrative team shall decentralize, exercise power and propose to the university council at to stimulate changes at department level.

6.5 The Integrated Entrepreneurial Culture

Clark (2004) stated that “the development of entrepreneurial culture can be viewed as moment from idea to belief to culture to saga”(Clark, 2004a). This element represents values or beliefs which can lead or happen after the other elements in the university transformation (Clark, 1998a). Culture should be carefully analyzed since it could give misunderstanding or unclear

image about the reality (Clark, 2004a). There are two ways to unfold the concept of the university culture and to make it closest to the reality. First, one has to portray the development of a new culture from an opinion to a common belief. Second, one has to insist that the university has its symbolic identities blended closely with its structural features. To see whether the culture is strongly embedded within the university or not, one can notice the strong practices (Clark, 2004a).

Considering that the first way of looking at culture is to understand how ideas has developed to be culture, the Clark's element about integrated entrepreneurial culture is still at the early stage since KMUTT has not yet officially introduced entrepreneurial university idea to its stakeholders and the definitions of the concept given by its internal stake holders are too various to consider it is a common belief of KMUTT. During interviews some KMUTT executives mention the vision of the university in becoming an entrepreneurial university. According to interviews, some KMUTT executives mentioned about the vision of KMUTT to be an entrepreneurial university. The entrepreneurial university definitions given during interviews are still uncertain and unclear. The interviewees sometimes said "It is intriguing" when they were asked about entrepreneurial university definitions. An interviewee suggests that entrepreneurial university is a university which sees the importance of the production professionals, promotes knowledge application and entrepreneurship mindset among students and academics. The university is able to make use of its intellectual property and knowledge to generate university direct income and add values to its external partners.

"We still see professional production as important. We want to create Entrepreneurship and innovation culture among students and academics. Another aspect is to make use of KMUTT intellectual property and knowledge to benefit the university such as creating direct income to the university and to add values to our external partners. These are the duties of entrepreneurial university." (Interviewee one)

Another interviewee suggests that entrepreneurial university is a university that cultivates human resources and develops technologies through its research activities which finally help promote new industries.

“My definition is that university is meant to cultivate HR and also to develop technology by research activities. Then the human resources are from university and technology from university. They are aligned to promote new industries. When universities HR and technology are engaged in this new industry promotion process, it can be called as an entrepreneurial university”.
(Interviewee two)

The vision to be an entrepreneurial university is not widely accepted and recognized among KMUTT internal stakeholders. The idea for KMUTT to announce itself as an entrepreneurial university has just been sometimes mentioned by KMUTT executives. Entrepreneurial university is still just a word used of some KMUTT university executives to promote the future direction of KMUTT. An interviewee stated that KMUTT still has not officially integrated the concept as part of the university identity and culture because once the entrepreneurial university concept to KMUTT was introduced, the concept was immediately criticized and opposed by its internal stakeholders mainly by academics because they have never experienced the concept and their focus are on only teaching, research and do publications. Some academics agree that university has promoted entrepreneurship among students and academics. However, there are different levels of entrepreneurship among departments and group of students. For example, not all departments of faculty of engineering maintain high entrepreneurship capability, there are some departments engaging significantly in entrepreneurial activities such as computer engineering. Considering that KMUTT is still at the early stage of introducing the term entrepreneurial university among its stakeholders, the integrating entrepreneurial university culture in KMUTT can be seen through the extension of existing practices such as diversifying financial sources, extending outreach administrative units, promoting changed oriented administrators and instilling entrepreneurship among academics and students. It is believed that KMUTT plans to adopt entrepreneurial university concept and should be called entrepreneurial university because the concept is seen as the ongoing trends at national and international levels which is promoted by educational thinkers especially those are influential in Thai government or private sectors.

Chapter 7 Conclusion

7.1 Conclusion

This study analyzed the dynamics of the pathway towards entrepreneurial university of KMUTT by using five entrepreneurial university elements of KMUTT based on Burton Clark's theoretical framework. The research aimed to answer the question: "how has KMUTT been operated as entrepreneurial university?" by conducting interviews and searching existing research on the topic. Upon examination of the five dimensions, it becomes clear that entrepreneurial university exists in Thai higher education to some extent and the entrepreneurial university concepts have been instilled in KMUTT. The university has an idea of pursuing and perceiving itself as an entrepreneurial university. One of Clark's elements of entrepreneurial university the "diversified funding base" exists strongly within KMUTT and it is likely to be even greater in the future. The "strengthened steering core" is still in its transitional phase. Other elements, including the "extended periphery", "academic heartland" and "integrated entrepreneurial culture" are in the early stage of KMUTT's transformation into an entrepreneurial university. This research discovers that entrepreneurial university is still a new higher education concept in Thailand. Internal communication, state regulations and existing bureaucratic mindset among university administrative and academic units make it is difficult for the university to bring changes or new values in its administrative and academic departments.

The analysis of the diversified funding base element proved that KMUTT has increasingly generated income from third stream income such as student tuition fee, external organizations and investments. The restriction in state funding stimulates KMUTT to be active in searching for income from other sources including industry and private sectors. Even though the diversified funding base element is strong in KMUTT, the strengthened steering core element still seems to be in its transitional phrase. This is because there appears to be an imbalance between top, middle and lower level managements. The university administrative management have been equipped with change oriented university managers and continuously been reconciled new managerial values among top management. However, the sentiment has not been fully shared within the lower management because of the rapid changes in university policy brought by top

management. Therefore, KMUTT still has to empower deans and the head of departments to promote changes in academic departments. The extended periphery element is in the early stage of development. The demand for external support also leads KMUTT to strengthen its collaboration with external organizations as well as establish and extend its outreach administrative units. However, the units still need to be improved to be proactive and interactive in linking academics with external organizations. Ineffective internal communication among units is seen as an obstacle towards the successful extended periphery. The stimulated academic heartland happens to be another element that needs further improvement. KMUTT academics have been involved in central administrative matters and supported the university in income generating as well as collaborating with external organizations. However, the department level is considered to be the most difficult unit to bring in changes concerning the entrepreneurial mindset. It is challenging for KMUTT top management to implement higher education trends or transitions at faculty and department level since the changes are not commonly known in the field of Thai higher education. Moreover, some academics perceive KMUTT as an institution with high stability rather than one who strives for survival. Therefore, some deans and academics cling strongly only to their existing main duties such as teaching, research and publishing rather than searching for external support themselves. Like other units of the university, academic departments combine both those who are changed oriented staff and conservative staff who are willing to change to support their university. However, they suggested it is important for the university to enhance internal communication and proactive policy implementation for all units. Finally, the “integrated entrepreneurial culture” has not yet been fully established. Entrepreneurial university has not been officially introduced among its stakeholders and the definitions of the concept given by its internal stakeholders are too various to consider as a common belief of KMUTT. However, the integrating entrepreneurial university culture in KMUTT can be seen through the extension of existing practices such as the diversifying financial sources, extending outreach administrative units, promoting changed oriented administrators and instilling entrepreneurship among academics and students.

The transformation of KMUTT towards entrepreneurial university is driven by the country’s economic demands. KMUTT’s valuable reputation in science and technology education and networks is kept in high regard by state and private sector. Therefore, the university is pushed to be a forefront university for economic development. KMUTT resources and capabilities include

the existing university industry linkages, various sources of funding, changed oriented university executives and the increased entrepreneurial spirit after receiving autonomy. These together make KMUTT a potential entrepreneurial university. Entrepreneurial university idea is derived from the state, private sector and international advisors.

The results of this research support the literature review that an entrepreneurial university behaves differently from traditional universities. Their existence generates hopes among policy makers. Entrepreneurial university has been defined differently that it is difficult to be described in a single concept. However, it is seen by Thai policy makers as a potential type of university which contributes to regional development as well as helps the country enhances economy. Thai higher education has adopted the entrepreneurial university concept from elsewhere. Moreover, like higher education in Asia, entrepreneurial university concept is still new to Thai higher education and emerging to solve financial stringency problems. Thai education, especially science and technology education, is under pressure to respond to the demands of state and industry since this field of education is seen as a key area to improve Thai economy. The emergence of entrepreneurial university concept in Thai higher education context is similar to the implementation of other educational policies such as NPM and quality assurance. Thailand policy makers borrow the initiatives from foreign countries and promote new ideas among Thai university executives. There is a match between the positive view from the policy makers on the roles of entrepreneurial university in economy development and KMUTT's core mission in producing practical graduates to support Thai society and economy. Therefore, KMUTT complies with the government's initiatives and becomes a strategic driver of Thailand's economic policy. Moreover, the entrepreneurial university model is also valued as a way for the university to survive the insufficient state financial support and reduce the mismatch of graduate profiles and labor markets. Entrepreneurial university in Thailand develops in the similar ways as some other universities in Asia that the concept was imported from western countries and stimulated by scarce resource such as limited public funding.

All in all, entrepreneurial university is a type of university which emerges as an alternative for Thai higher education and the nation. The successful entrepreneurial university implementation requires successful internal communication and understanding about the concepts among KMUTT stakeholders. KMUTT, like some of other universities in Asia, has instilled

entrepreneurial university concept to support national policies and survive the difficulties in its setting.

7.2 Areas for Future Research

It is recommended for future research regarding entrepreneurial university in Thailand to study more about other Thai universities. Although it is acceptable to use a university as a case study to explore the existence and the development of entrepreneurial university concept in a country, a multiple case study method could be used to compare different universities under the same theoretical frameworks and control variables. The scope of interviews can be broadened to involve more of other university internal stakeholders such general university officers and researchers as well as external stakeholders such as industrial partners, alumni and government. Moreover, an additional set of theoretical frameworks could have been used to analyze the case study to cover various factors influencing entrepreneurial university behaviors. It is recommended for future research to use quantitative research for various research contributions to the research topic. Research topics regarding university funding mechanisms in Thailand are suggested to be added to the country's higher education knowledge pool.

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Appendix

Appendix A Interview Questions and the key ideas used for interview question design

Clark	Interview Questions
<p><i>The strengthened steering core</i></p>	<ol style="list-style-type: none"> 1. Do you think that the university has been transformed from traditional university to an ambitious university in order to respond better to the changing economic and societal demands? Have the mission of the university been changed? 2. Is there an appropriate balance in authority between the top, middle and bottom levels of the university? Could you describe how this balance has been secured or how it could be improved? 3. Do you think that university managerial structure has been restructured to become flexible, effective and adaptive to changes? If yes, how? If not, why? (Authority line becomes stronger) and how does the university process its decisions? (Centralized or Decentralized, Top-down or Bottom up?) 4. Do you think that university allows and encourages academics participation in university decision making process? How this participation takes place concretely? 5. Do you think university administrators are change oriented? How? 6. Do you think university administrators actively seek for patrons or new infrastructure units that link up with the outside (Especially industrial firms) for the university?
<p><i>The expanded developmental periphery</i></p>	<ol style="list-style-type: none"> 1. How does the university collaborate with outside organizations? (Contract research, contract education, consultancy knowledge transfer, industrial contract, intellectual property development,

	<p>continuing education, fundraising or even alumni affairs?)</p> <p>2. Do you think the units flexible and easy to initiate and to disband? (Research centers, Science Parks or any other mediating institutions?)</p> <p>3. Do you think the university actively focuses on the creation of interdisciplinary units - units of teaching outreach, proliferating under such labels as continuing education, lifelong education, distance education, and professional development?</p> <p>4. Do you think the university becomes more “application-generated” (Put knowledge into use)? And how does the university promote it among internal and external stakeholders? (Units bring into university the project orientation of outsiders)</p>
<p><i>The diversified funding base</i></p>	<p>1. How has the university generated income? (Greater financial resources: 1st State 2nd stream income- research council, 3rd stream income – industrial firms, local governments, philanthropic foundations, royalty income from intellectual property, campus services, fees and alumni fund raising)</p> <p>2. What are/have been the most important income sources university attempts to develop as a source of income and why, as well as what are their future plans to diversify the income (if any).</p> <p>3. How does the multistream financial base enhance the even more important capacity to cross-subsidize internally? (top</p>

	<p>slicing and redistribution of funds)</p> <p>(How does the university financial support science and technology departments and social science departments? Ex. Cross-subsidizing (taxing rich programs to aid less-fortunate ones) (Not only seek to subsidize new activities but also enhance old valuable programs?)</p> <p>4. Do you think the university maintains higher educational values than money offered?</p>
<p><i>The stimulated academic heartland</i></p>	<ol style="list-style-type: none"> 1. How do academics help support university income generation? (Reaching and connecting, promoting third income with the outside?) 2. Do you think that Science and Technology departments and Social Studies support university differently in terms of income generating? 3. How do the academics take part in university strategies and decision making? 4. Do you think academics help the university connect with outside organizations? How? 5. Are there differences between units in this, if yes, why? 6. How do departments respond to the change in university policy? Do they make clear that they are not willing to respond to all demands? 7. To what extent they are allowed select what to focus on?
<p><i>The integrated entrepreneurial culture</i></p>	<ol style="list-style-type: none"> 1. How does the university promote a work culture that embraces change and entrepreneurial thinking? Please give examples how it is noticeable in practices concretely? 2. What are factors which help develop the university identity? What has the university done to promote these?

Appendix B Empirical studies of Entrepreneurial Universities in Asian context

(1998 – 2016)

Author	Unit of Analysis	Objective	Theoretical Framework	Methodology	Findings
Ryu (1998)	Yonsei University of Korea	To explore how Korean Universities and their professors have been responding to demands for knowledge creation	Entrepreneurial scholarship	Semi-structure interviews with senior male academic staff	Identification of strategic planning and the development of the academic services.
Eun et al. (2005)	Chinese Universities	To explain and evaluate the evolution of university-run enterprises	Triple Helix New Economics of science	Chinese situation from the 1980s to 1990s Secondary data	The universities show a path from a close integration to gradual separation with the industry.
Yokohama (2006)	Japanese and UK universities	To scrutinized the organizational change in Japanese and UK universities which are engaged in entrepreneurial activities	Entrepreneurial universities (Clark 1998;Sporn 2001)	Four case studies (Japan and UK) Secondary sources (documentation)	New institutional strategies (governance, management, leadership and funding) and the relationship with other institutions provide five types of entrepreneurial universties)
Wong et al. (2007)	National University of Singapore	To explore how Asian universities are responding to the globalization of the knowledge economy	Knowledge production and economic development	Case study Secondary data Descriptive analysis	Represent the change from a small and newly industrialized economy to the knowledge based economy in Singapore
Zhou and Peng's (2008)	Chinese universities	To understand the pathway to an entrepreneurial university	Triple Helix	Case study	The development of the entrepreneurial university was stimulated by state before becoming full university – industry collabolation.
Hu's study (2009)	Taiwanese Universities	To investigate the development of entrepreneurial universities in Taiwan	(N/A)	(N/A)	The University Industry Government linkages available to an entrepreneurial university are closely linked with patterns of regional innovation and industrial development.

(Keat et al., 2011; Yusof et al., 2008)	Malaysian universities	The inclination towards entrepreneurship among university students	Developed Demographics characteristics and family business background from various scholars.	Questionnaires	The university's role in promoting entrepreneurship and the curriculum and content along with gender, working experience and mother's occupation are statistically significant.
(Abduh et al., 2012)	Indonesia	To explore and provide recommendations on entrepreneurship education programs at an Indonesian university	Satman model developed by Abduh, D'Souza, Burley and Quazi (2007).	Exploratory research: Interviews and questionnaires	The findings imply that there is a need for urgent improvement in delivering entrepreneurship content.
(Savetpanuvong & Pankasem, 2014)	Thailand	to provide new developed conceptual framework for entrepreneurial university	Timmons Model of Entrepreneurial Process, Jochen Röpke (2000), Triple Helix, Learning Theories, Resource-based View, Diffusions of Innovation	Case studies Three interviews Literature reviews	New developed conceptual framework
Reyes (2016)	National University of Singapore	to explore issues and situations affecting the entrepreneurial university	Frame Analysis	Case study Secondary data Document analysis	Ambiguous setup staff perception, Intractability due to different interpretation on entrepreneurial university concept

Source: Based on (Guerrero & Urbano, 2012; C. N. Reyes, 2016) and Author

Appendix C KMUTT External organizations Engagement with external organizations

Engagement with external organizations	available	Unavailable
Number and Types of organizations and detail of activities	/	
Engagements with regions and cities		
Engage with clusters of local industry and service	/	
Link graduates with local companies, particularly, Small and Medium Enterprises		/
Engage in local civic and cultural events	/	
Engage with former local alumni	/	
Partnerships with business (Firms)		
Receive business research grants	/	
Provide consultancy for business		/
Engage business in the university governance		/
Engage business with the teaching of the university	/	
Engage business with university research	/ (7 academic and co-work With National Research University Clusters	
Engaging Entrepreneurs		
Engage entrepreneurs in teaching		/
Offer status to entrepreneurs as Fellow and Professors of Practice		/
Engage with local SME/Dominated associations for external Small Business clubs and chambers of Commerce		/
Have SMEs located in university technology and science parks		/
Social Enterprise		

Support for academic on their research for the broad benefits of society	/ (Research Publication presented in the International and National conference	
Provide opportunities for staff and students in departments of humanities to engage with the community	/	
Alumni Engagement		
Use web tools for continued social and professional networking; Graduation Year regular reunions	/	
Arrange alumni conference and meeting and support services	/	
Award alumni “Hall of Fames”; awards for alumni excellence in performance in their community	/	
Provide careers and lifelong support	/	
Others		
Spinouts	/	
Continuing Education	/	
Lifelong Education	/	
Distance Education	/	
Professional Development	/	

Source: KMUTT, 2017