

VALUES AND COMPETENCIES IN THE COMMERCIALISATION PROCESS OF  
UNIVERSITY INTELLECTUAL PROPERTY

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## **DECLARATION**

I hereby declare that the work in this thesis is my own except for the quotations and summaries which have been dully acknowledged.

June 04, 2015

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## ABSTRACT

Despite the presence of strong financial and legal atmosphere supporting commercialisation activities, there was a lack of success in commercialisation of the intellectual properties in universities. Lack of understanding of the role played by values and competencies of the individuals and organisations involved in the commercialisation process is perhaps one of the reasons that contributes to this situation. This study offers a values-competencies framework that explains the success and failure of university-led commercialisation by combining theories of innovation, psychology, management, and law. The objective of this study is to fill the gap in existing literatures on intellectual property commercialisation by explaining the role of values and competencies of individuals and organisations in influencing commercialisation in universities. Under the broader umbrella of qualitative case study using four cases, two successful and two unsuccessful commercialisation projects from Universiti Kebangsaan Malaysia, the study employed in-depth interviews using semistructured protocol to collect data from researchers, pre-commercialisation officers, technology transfer officers, and industry representatives. The study found that the values-competencies framework offers an in-depth understanding on the intellectual property commercialisation in university. A successful university intellectual property commercialisation is process-dependent. It requires an extensive understanding of the involvement of the individuals and organisations in different stages of commercialisation process, which was not emphasised in existing studies on commercialisation of university-led intellectual property. Among the nine values studied, entrepreneurial mindset has been found to be the most important value supporting the successful commercialisation on intellectual property. Other than that, a risk-taking, self-directed, and broad-minded individual supports also a successful commercialisation. University and industry with a strong research tradition and benevolence also contribute to the success of commercialisation process. Sector-specific competencies, ability to collaborate with others involved, leadership quality, and ability to carry out responsibility could also lead to a successful commercialisation. The study introduces a values-competencies-based commercialisation framework and contributes to the existing literatures on university-led intellectual property commercialisation process. The values-competencies-based framework has given a breakthrough by integrating the theory of social and private rights, the stage gate process, theories on values, and entrepreneurship to explain the success and failure of a commercialisation process in universities. The study found a new breed of individuals engaged in the commercialisation process in universities that hold commercialisation-friendly values and competencies. The emergent values-competencies framework can be considered in establishing a structured commercialisation process and to monitor commercialisation performance of individuals. The emergent framework could also be utilised as a guide in setting up a university incentive and promotion policies and in defining the role of innovation and teaching in universities, in ensuring effective utilisation of valuable national resources, and in reducing the commercialisation costs. This is especially important for a country like Malaysia where the percentage of research and development expenditure is far below the minimum amount spent by the neighbouring developed countries. The emergent framework can also help industries to choose universities with appropriate values and competencies to work on their research projects. Consequently, the university can specify their focus, set their strategies, maximise their capacity utilisation, and increase revenue from their research.

## ABSTRAK

Walaupun wujud sokongan yang kukuh dari sudut kewangan dan undang-undang untuk aktiviti pengkomersialan, pengkomersialan harta intelek di universiti Malaysia masih kurang berjaya. Kurangnya kefahaman tentang peranan yang dimainkan oleh nilai dan kompetensi individu dan organisasi yang terlibat dalam proses pengkomersialan barangkali menjadi salah satu daripada punca terhadap keadaan ini. Kajian ini memperkenalkan suatu kerangka nilai-kompetensi yang boleh menjelaskan kejayaan dan kegagalan dalam proses pengkomersialan yang diterajui oleh pihak universiti, dengan menggabungkan teori inovasi, psikologi, pengurusan, dan undang-undang. Objektif kajian ini adalah untuk mengisi jurang literatur yang sedia ada tentang pengkomersialan harta intelek dengan menerangkan peranan nilai dan kompetensi individu serta organisasi yang mempengaruhi pengkomersialan di universiti. Berdasarkan kajian kes kualitatif yang melibatkan empat kes, iaitu dua aktiviti pengkomersialan yang berjaya dan dua lagi aktiviti pengkomersialan yang tidak berjaya dari Universiti Kebangsaan Malaysia, kajian ini menggunakan kaedah temu ramah mendalam berdasarkan protokol separa berstruktur untuk mengumpul data daripada penyelidik, pegawai prapengkomersialan, pegawai pemindahan teknologi, dan wakil daripada industri. Kajian ini mendapati bahawa kerangka nilai-kompetensi mampu menjelaskan dengan mendalam tentang pengkomersialan harta intelek yang dilakukan oleh universiti. Kejayaan dalam pengkomersialan harta intelek universiti bergantung pada prosesnya. Kejayaan ini memerlukan kefahaman yang mendalam tentang pelibatan individu dan organisasi pada peringkat-peringkat yang berbeza dalam proses pengkomersialan. Hal ini belum lagi dibincangkan dalam kajian yang sedia ada berkenaan pengkomersialan harta intelek yang diterajui oleh universiti. Daripada sembilan nilai yang dikaji, minda keusahawanan didapati merupakan nilai yang paling penting yang menyokong kejayaan dalam pengkomersialan harta intelek. Selain nilai berkenaan, individu yang mempunyai ciri-ciri seperti berani mengambil risiko, tahu apa yang dimahukan, dan berfikiran luas turut menyokong ke arah kejayaan dalam pengkomersialan tersebut. Universiti dan industri yang ditunjangi amalan penyelidikan dan amal kebajikan yang kuat sememangnya menyumbang terhadap kejayaan proses pengkomersialan. Kompetensi yang khusus untuk sektor tertentu, kebolehan untuk bekerjasama dengan pihak yang terlibat, kualiti kepimpinan, dan kemampuan untuk melunaskan tanggungjawab turut membawa ke arah kejayaan dalam pengkomersialan. Kajian ini memperkenalkan suatu kerangka pengkomersialan berasaskan nilai-kompetensi dan menyumbang kepada literatur-literatur yang sedia ada terhadap proses pengkomersialan harta intelek yang diterajui oleh universiti. Kerangka yang berasaskan nilai-kompetensi telah memberikan kejayaan yang cemerlang dengan mengintegrasikan teori hak-hak sosial dan persendirian, proses gerbang berperingkat, teori-teori nilai, dan keusahawanan untuk menerangkan kejayaan dan kegagalan dalam proses pengkomersialan di universiti. Kajian ini menemukan sekelompok individu yang terlibat dalam proses pengkomersialan di universiti yang mengangkat nilai dan kompetensi yang rapat dengan pengkomersialan. Kemunculan kerangka baharu nilai-kompetensi tersebut boleh dipertimbangkan dalam mewujudkan suatu proses pengkomersialan berstruktur dan untuk memantau prestasi pengkomersialan individu berkenaan. Kemunculan kerangka baharu itu boleh juga digunakan sebagai suatu panduan bagi menetapkan insentif daripada universiti dan dasar naik pangkat serta untuk menjelaskan peranan inovasi dan pengajaran di universiti untuk memastikan penggunaan sumber negara yang berharga secara efektif dan untuk mengurangkan kos dalam proses pengkomersialan. Hal ini penting lebih-lebih lagi bagi negara seperti Malaysia yang mencatatkan peratusan perbelanjaan untuk penyelidikan dan pembangunan yang jauh lebih rendah daripada jumlah minimum yang dibelanjakan oleh negara-negara jiran yang sudah pun maju. Kemunculan kerangka baharu ini juga boleh membantu pihak industri untuk memilih universiti yang menyediakan nilai dan kompetensi yang sesuai untuk menjalankan projek penyelidikan mereka. Hasilnya, pihak universiti pula boleh menentukan fokus, menyusun strategi, memaksimumkan penggunaan kemampuan yang ada, dan meningkatkan hasil daripada penyelidikan mereka.

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## **CHAPTER I**

### **INTRODUCTION**

#### **1.1 BACKGROUND**

Commercialisation of intellectual property is one of the challenging tasks for effective innovation management at universities. Commercialisation is the process that transfers inventions from university labs to market for wider public use (WIPO 2006). Inventors, investors, and governments have long wondered what makes commercialisation process successful (Curtin 2012; Furman, Porter & Stern 2002; Thursby & Kemp 2002; Thursby & Thursby 2011a). For decades, studies have revealed a number of factors related to industries, universities, and government that influence commercialisation process (Geuna & Muscio 2009; Hearn, Cunningham & Ordonez 2004; Siegel, Waldman, Atwater & Link 2004; Stephan 1996; Thursby & Kemp 2002). The process of commercialising intellectual property involves various legal, marketing, as well as technical activities that are controlled by individuals and organisations involved in the process. These individual and organisational characteristics influence the success of commercialising intellectual property in universities. Current studies largely ignore the profound effect of individual and organisational characteristics and abilities on commercialisation process in universities.

Intellectual property is an innovation that has been legally registered and thus provides legal right to the innovator and the right of use to other stakeholders (Rasmussen, Moen & Gulbrandsen 2006). Research capabilities, low research cost, and public-private funding opportunities have transformed universities into centres of innovation in recent years (Kroll & Liefner 2008). Historically, the availability of

research funds, relaxed legal procedures, and control over revenue earned from innovations are the major factors determining the success of commercialisation (Debackere & Veugelers 2005; Feldman, Feller, Bercovitz & Burton 2002; Lockett & Wright 2005; Siegel & Phan 2005; Thursby & Kemp 2002; Wallmark 1997). However, recent concerns over the degree of innovators' involvement, the level of innovation disclosure by innovators, the attitude and competencies of researchers and technology transfer officers, and the type of technology transfer contracts and payment mechanisms shed light on individual and organisational values influencing the success of intellectual properties commercialisation at universities (Braunerhjelm 2007; Dechenaux, Thursby & Thursby 2011a; Khazanchi, Lewis & Boyer 2007; Thursby & Thursby 2011a).

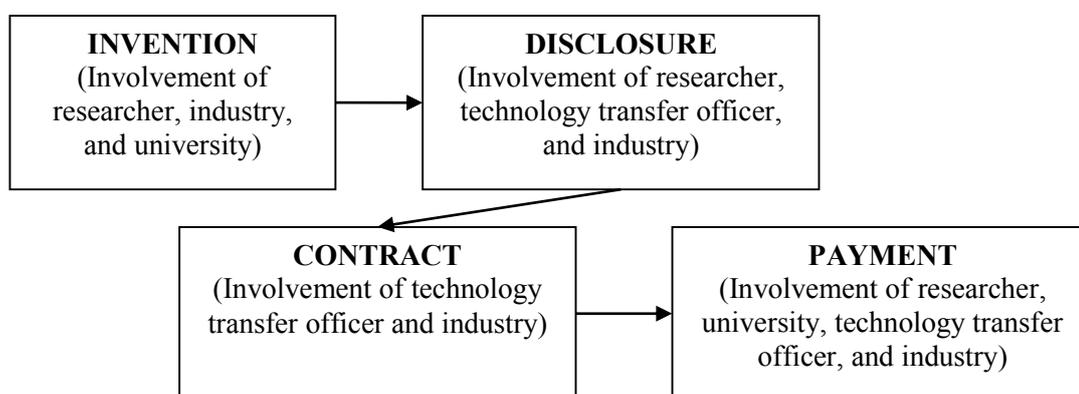


Figure 1.1 Stages of IP imbued with individual and organisational values

Source: Mirowski and Van Horn (2005)

### 1.1.1 Commercialisation Process

Figure 1.1 shows four stages of intellectual property commercialisation process in the universities. Invention, which is the first stage, involves the researcher, industry representative, and university research administrator. In this first stage, researcher is the key player, and the main objective of this stage is to create a quality, industry-specific invention that can be commercialised for wider social use. When the invention from the laboratory is ready to be fully utilised the university's technology transfer officer bids for the commercial use of the invention by the industry. In order to accomplish this task, in the second stage namely disclosure, the invention will be

disclosed for protection of intellectual property rights and for further use by the industry.

After the disclosure of the invention by the technology transfer officer on behalf of the university and the inventor, in the third stage, the industry representative will consider the relevant contract to formally include the invention in the purchase list. The contract will typically involve agreement on financial matters alongside post-purchase service and maintenance that will be done by the researcher. In the final stage, while settling the payment, two parties, namely, the technology transfer officer on behalf of the researcher on one side and the industry representative on the other side get into the contract of payment and the transfer of revenue based on the terms and conditions of the copyright transfer of the invention from the inventor to the industry for wider commercial use. When the invention reaches the payment stage, it indicates that the idea gets its commercial appeal and has a potential in the industry. That is how a successful invention is being commercialised. These stages also indicate that the activities involve individuals and organisations, thus the success of the commercialisation process would only be possible provided that the issues of characteristics of the individuals and the organisations affecting the stages are carefully addressed by three parties involved (researcher, technology transfer officer and industry player representative).

### **1.1.2 Values, Competencies, Technology Transfer, and Models of Commercialisation**

#### **A. Individual Values**

Values are individual and organisational characteristics that influence human and organisational involvement when pursuing certain goals (Munson & McQuarrie 1988). Values generate a number of individual and combined behavioural patterns (Rokeach 1973). Studies on values are common in marketing and management. Rokeach (1973) studied values to understand consumer behaviour and categorised values into instrumental values and terminal values. Instrumental values are characteristics that indicate certain human attitude or belief, while terminal values are characteristics that produce the ultimate outcome from any activity. Examples of

instrumental values include honesty, broad-mindedness, and intelligence, while examples of terminal values include world peace, equality, and national security. Instrumental values are found to be determinants of individual attitudes in consumer behaviour and individual psychology (Kahle 1983; Vinson, Scott & Lamont 1977).

Sagiv and Schwartz (1995) and Schwartz (2006) identified three types of values, namely individual values, collective values, and mixed values. Individual values are characteristics and principles related to individuals, such as researchers and technology transfer officers, involved in the commercialisation of intellectual property. Collective values refer to the characteristics and attitude of a group or an organisation. Mixed values are values shared by individuals and organisations. (Values strongly influence work process and extensive studies are yet to be conducted to explain the relationship between values and commercialisation process.

#### B. Organisational Values

Organisational values are extension of individual and societal values. The mission, vision, and organisational processes of an organisation are often built upon the values of its founders and leaders. Schein (2004) described organisational culture and ethical norms as values that are integrated in organisational processes. Various studies have shown that organisational values influence the achievement of certain goals (Braunerhjelm 2007; Khazanchi et al. 2007; Quinn & Rohrbaugh 1983; Slaughter & Rhoades 2009; Williams 2011). Figure 1.1 (in page 2) shows the involvement of individual and organisation in intellectual property commercialisation in universities. Each stage is imbued with values and competencies of individuals and organisations (Dechenaux et al. 2011; Jensen, Thursby & Thursby 2003; Thursby, Fuller & Thursby 2009).

#### C. Competencies

Individual and organisations' competencies have an influence on their own work process. Competence is the skill, knowledge, and qualities that enable individuals and organisations to perform certain tasks with the required efficiency (Woodall &

Winstanley 1998). There are several types of competencies, such as core competencies, organisational competencies, and task completion competencies. Core competencies are qualities that enable organisations to achieve superior goals and differentiate themselves from competitors (Prahalad & Hamel 1990). Organisational competencies are broadly defined as organisational rules and clear goals, which provide guideline in the completion of certain tasks on time (Lockett & Wright 2005; Rasmussen & Borch 2010). Task completion competencies are task-specific qualities and skills which ensure that all plans are successfully implemented (Liu, Chen, Jiang & Klein 2010). Organisational success is heavily influenced by the values and generic and task-specific qualities of individuals in the organisation (Corny 2004; Taylor 1911).

#### D. Importance of Values

Scientists have considered the importance of values in social practices. Values are characteristics that make individuals and organisations different from each other in executing certain processes (Munson & McQuarrie 1988). Positive values will have positive influence on commercialisation processes. However, the way in which university values and individual values influence commercialisation process of intellectual property has yet to be fully reflected in a single framework. Researchers usually discover new ideas after making countless sacrifices. Innovations being successfully commercialised, bring benefits to society. The facilities and assistance given to researchers during commercialisation process influence the result of commercialisation (Rasmussen & Borch 2010; Rasmussen et al. 2006). Attitude of researchers, which reflected their values, is especially crucial in the disclosure of innovation itself, choosing the contract for the transfer of technology, and the type of incentive universities offered to their researchers.

Individual values are characteristics, principles, qualities, traits, thoughts, and attitude/perception/belief of the individuals that distinguish their line of actions and their thoughts about certain phenomenon with respect to others (Schwartz 2006). There are positive and negative individual values. Rokeach (1973) identified 36 individual values and categorised them into instrumental values and terminal values.

Organisational values appeared as collective and mixed values in Sagib and Schwartz (1995). Sagib and Schwartz (1995) included five individual values as well. These studies on values are widely cited in the literatures of psychology and management to explain the inherent characteristics of individuals and organisations with respect to their performance in certain operation. Even though commercialisation of intellectual property is values-laden, past studies did not do a proper justice to the importance of values in explaining the outcome of certain phenomenon of interest.

#### E. The Technology Transfer Officers

Universities and governments in many countries have considered joint initiatives to establish technology transfer offices (Rasmussen 2008). The primary objective of these offices is to provide university researchers with technical and legal assistance during the technology commercialisation process. Officers responsible for technology transfer, who are also widely known as technology transfer officers, serve as the window who helps connect researchers and industries (Lockett & Wright 2005). Hence, the attitude of technology transfer officer towards a particular innovation, their intention (honesty), and their capabilities in handling technical and legal matters, influence the success of commercialisation (Debackere & Veugelers 2005; Rasmussen et al. 2006). Attitude is closely related with values and competencies. Values and competencies of individuals and organisations are reflected in their attitude towards any phenomenon (Schein 2004; Schwartz 2006).

Commercialising intellectual property is a complex organisational process that involves interactions between several stakeholders over time (Siegel & Phan 2005; Siegel et al. 2004). The intellectual property commercialisation system in the United States advocates empowerment of researchers, while that of the United Kingdom and countries with similar system vests greater authority to the university (Atkinson-Grosjean 2002; Kelli & Pisuke 2008; Pitkethly 2001). Hence, individual and organisational values are expected to be stronger in influence in universities that adopt United Kingdom commercialisation process. Innovation goals of universities usually have a much wider social context than the goals of researchers. Universities aim to increase their social contribution as well as increase their revenue from

commercialisation of intellectual property, while researchers place importance on increasing personal financial gains and reputation in the scientific community. However, Goldfarb and Henrekson (2003) argued that monetary and private benefits pursued by researchers are very likely to divert their attention from innovating for the sake of social welfare. Research conducted for social and moral causes are often financially unsuccessful due to the lack of private funding and lack of industry demand (Chakraborty & Mathew 2003).

Conflict of interest exists in the organisational atmosphere (university setting) as well. Universities should give priority to conducting basic research for social interest. However, universities also have to earn revenue from their technology commercialisation activities. Hence, more university technologies should be commercialised. This conflict of interest between basic and applied research is influenced by individual and organisational values. Moreover, university researchers have limited knowledge regarding commercialisation. To help ease this pressure, universities have established technology transfer offices. Attitude towards commercialisation and the abilities of technology transfer officers (TTOs) influence the university technology commercialisation process (Debackere & Veugelers 2005). For instance, if the technology transfer officer holds sector-specific competencies, s/he can understand the commercialisation process of specific technology better than others, which may eventually lead to quick commercialisation of the new ideas. Within a technology commercialisation process, technology transfer officers play dual role. They prepare due-diligence report and legal preliminaries for the researchers and the new ideas, and also arrange negotiations with the industry. Hence, there is subjectivity in the process, which requires proper understanding of the values and competencies of the technology transfer officers. These issues of values and competencies seemed to be ignored in the existing framework of technology commercialisation process.

#### F. Models of IP Commercialisation and Country-wide Experience

Two models are prevalent in the global university-based innovation management process: the United States model and the non-United States model. In settings that

utilise the United States model, researchers have ownership of their research (Atkinson-Grosjean 2002). The adoption of this model increases the tendency of researchers to control the innovation process. The United States model has been found to be successful in many studies as the model provides researchers with ample motivation and incentives (Siwek 2005; Thursby et al. 2009; Thursby & Thursby 2011b; Thursby, Thursby & Gupta-Mukherjee 2007).

In the non-United States model setting, the university has ownership of innovation, while researchers are given incentive for their work. The choices made by researchers determine their motivation for disclosing innovation and entering into innovation contract in the non-United States model. One of the major differences between the US and the Non-US model is that the US model has more individual control as the researcher own the innovation and controls the commercialisation process. However, in the non-US model, the researcher does not own the innovation and does not entirely control the commercialisation process. Hence, the choice of disclosure comes in. Consequently, the organisation influence in US model is lesser than the non-US model. Thus, in the non-United States model, the influence of both individual and organisational values in the technology commercialisation process can be expected to be higher. In order to succeed in their commercialisation efforts, many emerging economies plan to shift to the United States model of innovation management (Chang, Chen, Hua & Yang 2005; McQueen & Wallmark 1984). In a recent case on licensing, Thursby and Thursby (2011a) argued that more studies should be done to analyse how faculty participation influence the success of intellectual property commercialisation in order to understand the values inherent in the commercialisation process. Williams (2011) and Slaughter and Rhoades (2009) had explained the importance of values in international business, innovation management, and entrepreneurial ethics. Kelli and Pisuke (2008) noted that public awareness and their innovation competencies are important in innovation-based economies when dealing with commercialisation.

Hoye and Pries (2009) did an analysis of monopoly in commercialisation. Their study on a major Canadian university revealed that a group of repeat and habitual commercialisers control the policies as they are the ones who came up with

the most ideas. Due to the control exerted by these repeat and habitual commercialisers, many new researchers are facing difficulties when trying to commercialise their ideas. These repeat and habitual commercialisers know the system very well. They know how to acquire and use university resources effectively in their research. These repeat and habitual commercialisers are superior in terms of competence. As some of the universities have linked the incentives to commercialisation outputs, these repeat and habitual commercialisers block the way for the new commercialisers. Thus, universities must understand individual and organisational values and competencies to provide opportunities to the new innovators. Finally, Khazanchi et al. (2007) argued that organisational values are the building blocks of innovation culture in an organisation. Individual values are at the core of these values. Organisations cannot succeed in their pursuit of innovation if they do not understand the individual and organisational values involved in the process.

## **1.2 SIGNIFICANCE OF THE STUDY**

Universities are emerging as one of the major innovation centres in developing economies due to various dimensions. These dimensions include shortage of skilled labour in industry (Kroll & Liefner 2008), increased research capabilities of and funding for universities (Rasmussen & Borch 2010), better collaboration of researchers with industries (Walter, Auer & Ritter 2006), and increased overall government assistance to universities for the creation and management of innovation (Rasmussen 2008; Rasmussen et al. 2006). With the increased competition in the creation and management of innovation, universities are facing increasing challenge in developing, commercialising, and managing their intellectual properties (Feldman et al. 2002; Siegel et al. 2004; Thursby & Thursby 2011a; Thursby & Kemp 2002). In addition to their social role as innovators, universities have to efficiently manage a holistic process, from idea generation and fund management to commercialising innovations, while at the same time ensuring that proper rights of innovators are instituted and commercialised products add value to society.

Values are important in the commercialisation of the intellectual property due to a number of interrelated reasons. First, there is a trade-off between basic research and applied research. From the perspective of the life cycle theory, young researchers publish more basic research while older professors publish more applied research (Thursby & Thursby 2011b). The dilemma between skill versus passion of individuals and basic versus applied research undertaken by researchers may explain a significant influence of individual values and competencies in the commercialisation of intellectual property. Second, and related to the first reason, university researchers often do not have required knowledge regarding commercialisation process, particularly in relation to industry. In this regard, the skills and knowledge of technology transfer officers, who serve as links between researchers and industries, are important. Involvement of researchers and transfer officers, which represent individual and organisational values, are important factors influencing commercialisation process.

Thirdly, researchers may not be interested to commercialise their research, while technology transfer officers may not find researchers' inventions worth commercialising. The perception of researchers and technology transfer officers regarding both the invention and the innovation process has profound influence on the commercialisation process. Fourthly, researchers share a percentage of equity from spin-off companies established based on their innovation. The percentage of equity and terms written in the commercialisation contract, which are presumably influenced by and agreed upon by both the researchers and representatives of universities, indicate the importance of understanding both individual and organisational values in managing the process of commercialising intellectual property. Despite the unique importance and clear indication of psychological and behavioural impact on commercialisation process in recent literatures, existing studies are yet to explain the influence of values in the commercialisation process of the university intellectual property. According to Kahle (1996), values are characteristics that help us understand the psychological process of individual and organisational decision-making. Hence, values are mostly psychological constructs. However, there is no established framework to explain the concept of values in the process of commercialising intellectual property at universities.

Values, however, must be complemented with competency. An honest but incompetent researcher does not have the capability to support commercialisation of innovation, and vice versa. Competent researchers and technology transfer officers are valuable assets to universities. Existing studies place importance on the research skills of researchers and emphasize that commercialisation fails due to researchers' lack of commercialisation-specific knowledge as well as researchers' lack of entrepreneurial skills. However, not many researches have been done regarding competencies of researchers in the commercialisation of university intellectual property (Thursby & Thursby 2011a). Existing studies argue that the presence of technology transfer officers at universities is positively related to the success of commercialisation (Debackere & Veugelers 2005). Skilled technology transfer officers can negotiate better and can bring better financial gains for universities. However, just as the situation the researchers are in, the competency of technology transfer officers has to be given due attention in literature. Thus, new studies need to be done to understand how values and competencies of individuals and organisations influence the process commercialising intellectual property at universities.

An interesting idea is much preferred than an expected to be true idea (Smith 2003). New ideas and their ability to disprove conventional thinking regarding factors affecting commercialisation of intellectual property are the two basis for argument in this study (Boote & Beile 2005; Smith 2003). The values-competencies framework is a new as well as an interesting idea in the field of commercialisation of intellectual property. This framework is not yet well developed in the area of commercialisation process. The following paragraph presents several contentions that make values-competencies based intellectual property commercialisation framework interesting:

**A. Newness of the idea:** The process of commercialising intellectual property is laden with values. There is lack of studies on the role of values and competencies in the process of commercialising university intellectual property. This is a critical omission given that the process is carried out and supported by individuals, particularly researchers and technology transfer officers. This study uncovers the role of values and competencies, and aims at offering a new framework for the successful

commercialisation of intellectual property at universities. Together, values and competency can offer a framework that help researchers make appropriate decisions and take corresponding actions to ensure success and avoid failure of projects. Based on the values and competency indicators, university administrators can get an idea of the possible outcome of a research well before the completion of the commercialisation process. Hence, values-competence framework redefines the commercialisation process of intellectual property at universities.

**B. Disprovable conventional factors:** Commercialisation of intellectual property depends on a combination of individual and organisational efforts. Conventional factors influencing commercialisation of intellectual property include conducive legal atmosphere, availability of research funding, and support facilities. However, these factors for the most part represent organisational involvement and ignore the importance of individual factors that determine researcher's motivation for making disclosure and ability to push through the innovation process, and the ability of technology transfer officers to support commercialisation activities. Therefore, existing literature does not provide a comprehensive framework to explain and guide successful commercialisation of intellectual property at universities.

**C. Empirical connection:** Even with higher level of funding, good research facilities, and strong legal atmosphere, many universities are facing increasing challenge when commercialising their intellectual properties. Synthesis of existing studies revealed that the missing link between university effort and successful commercialisation of intellectual property can be bridged by giving emphasis to individual values, as well as organisational values involved in the commercialisation of the intellectual property at universities. Values-competency-based framework enables researchers and other stakeholders in the commercialisation of intellectual property to appreciate and give more meaning to the process. This will naturally induce and strengthen the values and competencies required to support the commercialisation process of intellectual property.