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Procedia - Social and Behavioral Sciences 172 (2015) 331 – 335

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**Procedia**  
Social and Behavioral Sciences

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Global Conference on Business & Social Science-2014, GCBSS-2014, 15th & 16th December,  
Kuala Lumpur

## The Role of Potential Licensee Availability in Facilitating Commercialization of Academic Research Results

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### Abstract

This paper mainly focuses on investigating the effects of the availability of potential licensee as a measure of academic commercialization. Moreover, a qualitative research method is adopted based on the case study approach. In order to explore the issues of this study, ten face-to-face interviews were conducted. The respondents were chosen among inventors, researchers, academic entrepreneurs and Technology Transfer Office staffs in Universiti Teknologi Malaysia (UTM). The researcher used content-analysis approach to analyse the data obtained from the interviews. The results showed that the availability of potential licensee and awareness of the invention market potential facilitated the invention commercialization.

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Peer-review under responsibility of GLTR International Sdn. Berhad.

*Keywords:* Commercialization; potential licensee; market potential; research output; university.

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### 1. Introduction

The commercialization of university-generated knowledge looms large in public discussion nowadays and is mainly due to the production of scientific results taking place at universities, as well as the interface between universities and industries that has come into focus. The role of academic institutions present in society has been analyzed with many different disciplines (Clark and Neave, 1992). Since the 1960s, universities have been considered as institutions that are devoted for creation and diffusion of knowledge for public good, mainly through research and education, thus contributing to the economic and scientific growth of a country (Mansfield, 1991; Rosenberg and Nelson 1994;

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Mansfield and Lee, 1996). Recently, a new stream of research has been focusing on technology transfer activities performed by universities. Numerous empirical analyses based on U.S. context have examined the different forms of technology transfer which includes patents (Henderson et al., 1998), academic start-ups (Gregorio and Shane, 2003; Shane, 2004), TTO activities (Thursby et al., 2001), incubators (Mian, 1996) and university-industry research collaborations (Shane, 2002).

Since competition has become increasingly knowledge-based (Amesse and Cohendet, 2001; Ruggles, 1998; Scarbrough and Swan, 2001), firms need to manage the knowledge internally (Grant 1996; Hansen 2002; Spender 1996). However, companies need the ability to manage acquisition and emission of knowledge to realize the potential in terms of knowledge assets (Chesbrough, 2003; Ford, 1988). In fact, more companies make use of external knowledge exploitation, i.e. the commercialization of knowledge assets.

However, transferring technology into wealth is considered a risky activity that will probably decrease the success rate of project growth or it may influence investments in such projects (Dorf & Worthington, 1990; Eldred & McGrath, 1997) whereby the cost assigned to each project is restricted. Therefore, the success of academic commercialization will be a serious issue for universities and the government.

The main goal of this study is to analyse the practitioners' responses; to explore how the availability of potential licensee can improve the commercialization rate. The study was conducted as a case study at Universiti Teknologi Malaysia (UTM), which is a leading university in Malaysia (Aziz et al., 2011).

## 2. Literature Review

### 2.1 University Commercialization/ Technology Transfer

Technology transfer is a procedure which is considered to be an idea emerged in one institution, in a particular area, or for one purpose, and is being utilized in different institutions, in different areas, or for a different purpose according to Schacht (2003). The economic benefits of a technology or technique occur when a product, process, or service is brought into the marketplace, where it can be sold or used to increase the productivity as per Schacht (2003).

The licensing agreements, university spin-offs and research joint ventures are important principal fiscal tools for transferring technology from academia to the market (Siegel and Phan, 2005). The two important conditions for transferring technology include 1) the intellectual property (IP) owner should be able to convince a buyer, especially when technology has a greater potential to attract market; 2) the potential licensee should evaluate whether the IP possesses a value that surpasses the expense for patenting, licensing, and other opportunistic costs according to Elfenbein (2005). Although rules have been implemented to ease technology transfer, the government is not satisfied with the commercialization level of public funded research.

### 2.2 Availability of Potential Licensee

The market research phenomenon is considered to be one of the successful keys in the commercialization process of every research output. The research process is taken up by industrial research teams from the very beginning when they recognize it as a problem with several reasonable solutions (Hindle and Yencken, 2004). As per existing literature on R&D management, four different forms of generations of R&D strategies were indicated (Liyanage & Greenfield, 1999; Miller & Morris, 1999; Niosi, 1999). In this regard, the first generation of R&D is to find scientific shortcuts, followed by the next generation that mainly focuses on the aspects of shortcut feasibility. The third generation is mostly dedicated to satisfy customers' needs and wants for the products and services, whereas the fourth generation is known because of its association with independent research agents as per Miller and Morris (1999).

On the other hand, for achieving competitive advantages through the successful development and commercialization of a new product requires capabilities such as convergence innovation, opportunity scanning and exploitation (Song and Parry, 1997). Marketing literature having market orientation and is mostly market driven (Day, 1994) has been widely accepted as the precursor for creating competitive advantages through innovation and new product development.

The main problem existing within China's innovation system is that most of the industries don't have sufficient R&D ability, which is a common concern to most companies present in China. The industrial company does not have

the ability to obtain technology through other arrangements. Hence, commercializing patents is very much needed by industrial companies from universities, whereas for the universities, these enterprises can be considered as a potential market for commercialization (Xue, 2007).

Xue (2007) stated that if an industry is lacking in strong R&D capabilities, it means that most of the existing potential for universities, especially in research coming from engineering facilities and departments will be very difficult to commercialize through industrial companies. For inventors, universities may offer support and assistance for the establishment of a specific fund in order to promote work opportunities and income. Technology contracts and joint research can help inventors to collaborate with the industry and in return, facilitate inventors to begin small scaled, technological advanced enterprise. Colyvas et al. (2002) found that in some cases, industries use a particular technology before it is patented. In special cases where an invention has higher and urgent potential market value, some industries 'booked' and developed these technologies before it is patented even though the invention is still at an embryonic stage.

The main reasons for not exploiting university technologies are because said technologies did not show any commercial value and were so embryonic such that it did not even provide sufficient proof of concept (Thursby et al., 2001; Thursby and Thursby, 2003; Siegal et al., 2003). Malaysia is being considered as a huge potential market with many industries. Universities are always looking into the opportunity for research commercialization. It is a fact that enterprises need scientific and technological achievements arising from various universities but the university research commercialization cannot be successfully implemented due to a lot of scientific research proposed by colleges and universities do not meet the actual needs of the enterprises and also the market. It is reported by Swamidass and Vulasa (2009) that many university inventions don't have any relation to the market, especially when the industrial companies are reluctant to provide research fund for invention. Also, many university inventions are always based on technology push which is mainly looking for the market instead of market pull, where the market searches for new inventions.

To some extent, scientific and technological innovations within colleges and universities are often imposed with the phenomenon of losing touch with the market. Moreover, many colleges and universities are lacking in efficient technology transfer mechanisms. Only a few university researchers contact university technology transfer of enterprises by themselves but often with the lack of understanding towards the market. In addition, many colleges and universities with research projects are not attuned towards market demands due to limited knowledge in market research and relevant understandings of the information related to industrialization. Luan et al. (2010) demonstrated that industries and market requirements need to be considered by the university researchers to commercialize the patent at the very beginning in order to generate beneficial knowledge. In other words, the approach is the combination of research knowledge and industrial market demand to increase opportunities and achieve research commercialization.

### **3. Research Methodology**

This study is mainly based on qualitative research method and designed to use case study approach. Creswell (2007) compared the case study method with other designs and proposed that case studies are unique for its concentration on certain boundaries of an activity to study thus providing various viewpoints towards the problem.

In this study, a Malaysian university was chosen to explore how the availability of potential licensee can improve commercialization rate. The decision to select UTM for this case study was due to the nature of qualitative research, which needs to have a smaller sample size as per Patton, 2000. Innovation and Commercialisation Centre (ICC) is a department in UTM, which is responsible for developing and commercializing UTM's research outputs. There is a strategic orientation for research, development and commercialization in UTM, which is centered on an entrepreneurial culture, collaborative effort and engagement of parties beyond the university (Aziz et al., 2011).

The research population consists of researchers, inventors, academic entrepreneurs, and technology transfer office staff, who are all engaged in the commercialization of university research output, both directly and indirectly. The units of analysis were selected from the list of portfolio IPRs (Intellectual Property Rights) supplied by the ICC and among the classes are utility innovation pending, utility innovation granted, patent pending, patent granted, industrial design application and registered industrial design.

A total of nine inventions were selected for this research as well as three sub-samples which include inventions that were exploited through spin-off companies, inventions that were exploited through licensing to established companies, and the unexploited inventions. These inventions were purposely selected in response to the interview questions. Three inventions were unexploited, and six inventions were exploited (four inventions were licensed to spin-offs and two inventions were licensed to established companies). A total of ten interviews were conducted with nine inventors and one ICC staff. The academic backgrounds of the respondents include mechanical engineering, civil engineering, electrical engineering, photogrammetry, laser scanning, biomedical, physics and chemical engineering, whereas the ICC staff holds the position as an IP manager. In general, the respondents were divided into four groups.

Ten interviews were conducted to investigate the concept of how the availability of potential licensee can improve the commercialization rate of university research outputs. The interview guides adopted standardized open-ended questions for each group. The decision to apply semi-structured interview method and open-ended questions was made because this research needed both particular data as well as wider perspectives on the phenomenon being studied. The interviews were recorded and transcribed for further analysis. The qualitative analysis method as provided by Miles and Huberman (1994) was adopted in this study as a leading framework to analyze the qualitative data, which include data reduction, data display, and conclusion drawing.

#### 4. Results and Discussions

Based on the interviews, the commercialization of university research outputs was influenced along with the availability of potential licensee, which embedded various crucial issues. Furthermore, the availability of potential licensee plays a key role for the commercialization. Table 1 shows the summary on issues based on the findings.

Table 1. Sub-themes

| Main Theme                         | Sub-themes   |
|------------------------------------|--|
| Availability of potential licensee | <ul style="list-style-type: none"> <li>➤ opportunity recognition in R&amp;D and commercialization</li> <li>➤ consideration of market requirement</li> <li>➤ identification of potential licensee and demand</li> <li>➤ mechanisms to identify potential licensee</li> <li>➤ lack of demand and difficulty in identifying potential licensee</li> </ul> |

(Source: Compilation made based on interview)

It was found that the availability of potential licensee gained 90% feedback from the respondents, and this showed that the opportunity for recognition in R&D and commercialization is one of the major issues. In general, the idea for research and commercialization comes to mind when researchers investigate the existing systems and models available in the market, as they can find problems and gaps associated within the systems, therefore providing an appropriate solution for it. The findings revealed the same issues as mentioned by Hindle and Yencken (2004). Before the university and inventors make the decision to commercialize an invention, they must be aware of the market potential of the invention. Therefore, consideration of the market requirement is crucial to be successful in commercialization, and this finding is consistent with the suggestion made by Luan et al. (2010).

The findings showed that the industries present in Malaysia should be aware of the fact that in order to stay competitive, they need to have R&D capabilities, however the industries in Malaysia don't focus on R&D. Most technologies in Malaysia are imported and not designed domestically. The engineers present in the Malaysian industry are not design engineers and only know how to operate and maintain. They also do not have in-depth technical and theoretical knowledge. Therefore, the weakness in R&D is a big opportunity for collaboration between the university and the industry, whereby it is also a chance to transfer its IPs into the industrial market. Moreover, collaboration with industries in order to create and develop new technology is recognized as a critical way to attract potential licensee. The main advantage of collaborating with the industry is to develop inventions based on market requirement as the industry is more aware of customer needs. This finding shows a similar issue raised by Xue, (2007). The research also shows the lack of demand for university's IPs in the market which can be the result of the incompatibility of university technologies with the industrial requirements. These findings are consistent with the issues as stated by Swamidass and Vulasa (2009), where they have mentioned that many university inventions do not have relevance to the market.

## 5. Conclusion

The availability of the potential licensee is regarded to be a critical factor. It is proven that the initial awareness of the market potential of invention largely affects the success of invention commercialization. Therefore, considering the industry requirement and recognizing opportunity are vital for the commercialization process. Thus, it can be concluded that identifying potential licensee is an ideal and essential step before commercializing the invention.

## Acknowledgments

The authors gratefully acknowledge the support from Universiti Teknologi Malaysia (UTM) through Malaysian Government Science Fund No. 02-01-06-SF1107.

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