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**Determinants for a Successful Commercialisation of Technology Innovation
from Malaysian Universities**

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Abstract

The emphasis on innovation as the engine for economic growth has resulted in research institutes and institutions of higher education to consider commercializing technology innovation as one of their core activities for income generation. Although supports for this purpose have been made available by universities, public organisational bodies as well as governments, the success rate of commercializing technology innovation in Malaysian institutions of higher education is still not encouraging. This paper aims to report a study that investigated the determining factors for a successful commercialization of technology innovation among Malaysian academic researchers. For this purpose, interviews with four academic researchers who have successfully commercialized their technology innovations have been conducted. The study found that there are five determinants that contribute to the success of commercializing technology innovations. These determinants are the researcher, technology, business partner, commercialisation path and networking. Among these determinants, the inner drives of the researcher were found to exert the strongest influence. These factors, however do not work independently, they are work interdependently with each other in achieving a successful commercialisation of the technology innovation. The identification of the factors that contribute to the successful commercialisation of technology innovation is useful for researchers as well as universities to develop an effective strategy for a successful commercialization technology innovation

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Key words: Determiners, Technology Innovation, Commercialisation, Malaysia Introduction

Introduction

Contextualising within a knowledge-based society, innovation has been recognised as the engine for wealth creation of a nation. In this regard, commercialising technology innovation has been considered as avenues to generate income not just for the nation, but also for institutions of higher education. Innovation and entrepreneurship are important drivers of productivity and wealth creation. Technology innovation is viewed as products that should be based on industrial needs and that they are relevant to private sector (eg Powers and MCDougall, 2005; Agrawal & Henderson, 2002; Nicolaou & Birley, 2003) to boost economic activities (Dietz & Boseman, 2005); and to create new jobs (Di Gregorio & Shane, 2003; Perez & Sanchez, 2003).

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Further, the recognition of commercialising technology innovation has resulted in the changing of understanding of the research and development process. The research process and product development process are considered equally important and emphasis has been given to ensure that the invention of technology innovation enters the market place and subsequently achieve a sustainable business growth. Considering the recent emphasis of commercialisation of technology innovation in the new product life-cycle, an understanding of the factors that contribute to the success of commercialising technology innovation is necessary.

There are different strategies available for commercialising technology innovation. Some institutions opted for internal approaches, quasi-internal approaches and externalisation approaches (Markman et al., 2008). These strategies can be adopted by identifying novel IP with commercial potential, continuing strategic and financial support for portfolio companies to maximise their chances of success (Siegal & Wright, 2007). This also can be done by encouraging collaboration between regional universities, research centres and other organisations (Siegal & Wright, 2007). To encourage more commercialisation, there should be incentives rewarded for academics so that commercialisation activities are valued (Siegal, Veugelers & Wright, 2007).

Commercialising technology innovation is a complex process as it involves risks and uncertainties. There are many instances whereby a technology fails to establish new ventures or the expected income generation for the innovators. It is claimed that most of the technology innovation ended in the valley of death (Ford, Koutsky & Spiwak, 2007) in which they fail to enter the market place and achieve sustainable business growth; hence the funding provider faces negative return of investment (ROI).

The commercialisation of technology innovation has been considered as one of the most critical agenda in Malaysia since 2008. Malaysia views that there is a need to cultivate the culture of innovation and creativity in order to achieve a high-income developed nation by 2020. In the recent Economic Report 2013/14, the Ministry of Finance has announced that innovation remains a focus in the country's development agenda. Furthermore, responding to the agenda of the Tenth Malaysian Plan, the Ministry of Higher Education has addressed the commercialisation and innovation development as its "Niche 1", indicating its important contribution to the development of the nation (Abd Aziz, Harris and Norhashim, 2011).

In relation to this, the Malaysian government over the last 20 years has provided allocations, grants, subsidies and incentives to intensify research, innovation and commercialisation activities (Govindaraju, 2010). Among the supports and facilities provided by the government are: i) the allocation of grants, such as Intensified Research Priorities Area (IRPA), Fundamental Research Grant Scheme (FRGS), Exploratory Research Grant Scheme (ERGS), Long-term Research Grant Scheme (LRGS) and TechnoScience Fund; ii) the establishment of a new business development unit, namely the Malaysian Technology Development Corporation (MTDC) under the Ministry of Science, Technology and Innovation (MOSTI); and iii) the establishment of technology incubators in universities and research centres. Recently, a national innovation agency named as the *Agensi Inovasi Malaysia* (AIM) has been established to push for "innovation economy" towards achieving a high-income nation status. Although various supports have been provided by relevant parties such as the university, government, and public organisational bodies, the success rate of commercializing technology innovation is still not encouraging. It has been reported that

only a small percentage of the technology innovation from the university has been commercialised (Abd Aziz, Mohd Yusof & Mohd Idris, 2010; Low, Amran & Aslan, 2012). Among the reasons for the low performance is the lack of business acumen among researchers, a skill which is necessary for a success commercialisation (Low, et al. 2012).

This paper aims to present the determinants for successful commercialisation of technology innovation among academic researchers in Malaysia. Specifically, this paper discusses five determiners that contribute to successful commercialisation of technology innovation. These five determiners are drawn from the experience and perspectives of four researchers who have won national and international awards for their invention and have successfully commercialised their inventions. It is important to highlight that the ways in which these determinants contribute to the successful commercialisation of technology innovation is shaped within the policy of the university where the academic researchers are attached as well as the policy of the Malaysian government.

Research Method

A qualitative research method has been adopted to identify the factors that influence a successful commercialisation of research innovations. In this study, interviews with four professors who have successfully commercialised their research products have been conducted. To ensure rich data collection, the selection of the professors to be interviewed was based on a purposive sampling (Patton, 2002). The four respondents were purposely selected based on their achievements in commercialising their technology innovations which have been demonstrated from the awards and recognitions they receive for their innovations. All the four professors have received local and international awards for their innovations. In this paper, the four professors are identified as Professor J, F, H and K for the purpose of anonymity.

To capture in-depth understanding of the factors for a successful commercialisation, face-to face interviews were conducted using semi-structured interview questions. The structure of the interview questions were designed specifically to capture the respondents' real experience, opinions and expectations (Patton, 2002) related to successful commercialisation. The interview lasted about one hour per session and it was conducted at a different time and location which has been agreed by the respondents.

After each interview session, the interview data was transcribed and the meanings constructed from the interview data were e-mailed to the respondents from their approval. Their feedback on the meaning construction was sought as a means for cross checking and validating the data. They were allowed to delete or change information that they felt did not represent their views and experiences. These follow-up checks from the respondent ensures that the researchers' subjectivity do not dominate the findings (Patton, 2002, Holliday, 2007).

A thematic approach was employed to organise and analyse the data. The data were rearranged under themes or categories (Halliday, 2007, King and Horrock, 2010) and they underwent three stages of coding and categorisation process: a) developing a coding index; b) coding the data based on the coding index and c) sorting the coded data into different categories. This three-stage process was developed based on axial coding (Corbin and Strauss, 2005), in which a general coding index was constructed based on the relevant

literature and research questions. Additionally, using inductive analysis, the possible themes and categories were discovered by looking for key phrases, terms and practices.

Findings And Discussions

Based on the data analysis, five factors have been identified as the determinants for a successful commercialisation of technology innovation. As shown in Figure 1 below, these factors are: i) the researcher or innovator, ii) the technology or product, iii) the business partner, iv) the strategic commercialisation paths and v) networking. All the five determiners are explained below. These factors are interrelated to each other as they operate together towards the success of a commercialisation of a technology innovation.

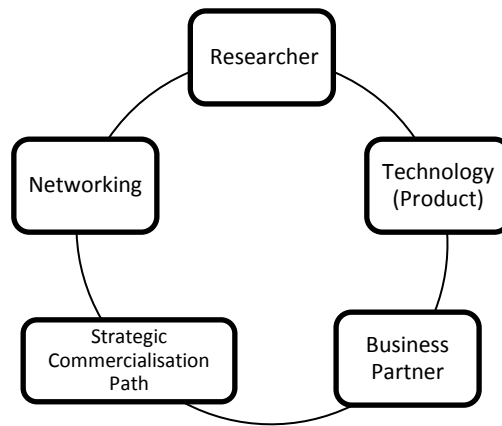


Figure 1: The five main determiners for a successful commercialisation of a technology innovation

Researcher or Innovator:

Champion of his own invention This study found that there are similarities in the personality of the four researchers that have successfully commercialised in their technology or invention. All the professors interviewed agreed that they need to have a strong belief and confidence in their own invention as they are the one who know the features and market value of their invention. In this regard, Professor J strongly emphasised that researchers need to be “a champion” of their own invention. Further, their ultimate goal for commercialisation is not merely to gain a maximum monetary profit, but rather to achieve satisfaction for the betterment of the society and nation. Professor H personally highlighted this matter by expressing this statement:

Do not be greedy. Do not ask for how big is the piece of cake you will receive. Money is not the ultimate goal of R&D product commercialisation. It gives satisfaction when you can contribute to the prosperity of local entrepreneurs based on the success of your product commercialisation.

With respect to their nature of work, the Professors were disciplined in their work and have strong determination and will to commercialise their invention. They were also risk

takers and “willing to sacrifice everything, including time, money and energy” (Professor J). All the professors admitted that they need to have some entrepreneurial and good communication skills. These skills are crucial as they need to be able to negotiate and build productive relationships with their business partners as well as other parties who are interested with their invention. Further, researchers need these skills to convince their potential buyers or partner the value of their technology. These skills also help to protect researchers from being manipulated by others. As highlighted by Professor H,

The most important is sufficient knowledge of business to protect you from being manipulated or tricked by irresponsible entrepreneurs. By having this knowledge, researchers can exert some bargaining power when negotiating with the business partner.

Technology or Product invention as Market Solution

All the four Professors felt that a technology with strong market values have better chances to succeed in commercialisation in comparison to a cutting-edge or novel invention. Inventing a cutting-edge product with unique features does not necessarily guarantee that the product will have a commercial or market value. Professor K particularly stated that “commercialisation is about taking the solution (not only the product) into the market”. In relation to this, he outlined four important considerations for a successful commercialisation:

- Focus on inventing a solution of customers problem;
- Identify the technology within its eco-system;
- Consider the possible competitors of the invention from the solution perspective, not for the product perspective; and
- Focus on efficiency, effectiveness and cost saving of the market solution in comparison to existing competitors

With regards to identifying the product within its eco-system, Professor K suggested several guidelines:

- Identify the problem you intend to solve;
- Identify who is going to benefit from your product;
- Who is going to use your product;
- Identify who is going to purchase your product; and
- Build networking with key players in the product eco-system

Selecting Suitable Business Partner

Another important point to be considered is selecting the right business partner. Professor H considered this factor as the most challenging factor in commercialisation. According to him,

Your partner does not need to be a rich person. You should be careful as there are cases where they take advantage of you. They control you. We have to find a partner which we can work together, and both parties understand each other. ...

In this case, researchers need to be careful when selecting a business partner that does not take advantage of them in any circumstances. One way to determine these criteria is to use one's own senses; however, to rely on one's senses tend to be subjective. Hence, researchers should spend time with the business partner and read their body language. Another way is to analyse the profile of the company carefully.

It is a necessity for a business partner to be competent in marketing and sales since the main role of a business partner is to market and sell the R&D product. In this case, the business partner should have direct contact with the buyers and users and be able to conduct market analysis for competitive edge of the product. The business partner should be well-versed of the customers' needs and demands. Besides, the business partner should have some basic technical knowledge on the functionality of the R&D product in order to be able to convince the potential buyer. A business partner should also be able to provide financial supports, if necessary. Considering that both researchers and business partner have to work together for a successful commercialisation of the product, it is important for both of them to work together as a team. In this regards, they should have common goals and interests.



Figure 2: Attributes of good business partner

The success of a technology commercialisation is not a one-man show, in which the researcher needs to understand the business world. The business partner also needs to understand the world of the researcher. They need to take part in the development of the product and understand the world of the researcher. By doing so, both parties will be able to understand each other and they can build common goals toward achieving successful product commercialisation. In this case, there should be a bridging between the two worlds: the world of the innovator and the world of business. According to Professor H, "A researcher has his ego - I want to produce; the businessman also has his ego - I want to sell. So, there is a conflict and the bridging between both parties is not so strong" Hence, there should be a two-way bridge, not just one-way bridge. In relation to this, Professor J described the relationship of the both parties as a marriage relationship in which

It is a dynamic relationship. It is like a marriage as well. You have to manoeuvre, you have to steer this relationship, daily, everyday. You cannot let it go just like that. You have to have each other. Your partner needs you; you also need your partner’s help. The understanding of each other is not static because people change and situation change.

By equating the relationship between the innovator and partnership as a marriage shows that this is a crucial factor in determining the success of commercialising technology innovation.

Identifying Strategic Commercialisation Path

The four Professors unanimously agreed that there is no one common way to commercialise a technology innovation as each innovation has its unique features, hence researchers need to plan and decide carefully the most suitable strategy of commercialisation. As shown in Figure 3, once the researchers have secured the Intellectual Property Right (IPR), they have several options (assignment, licensing, joint venture, etc). At this stage, it is crucial for researchers to determine which path they have to choose and they need to consider several factors, such as the nature of invention and the preference of the innovator (either to retain or to surrender the ownership of the invention).

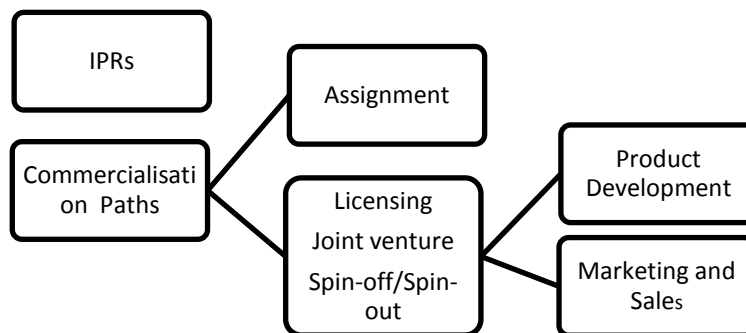


Figure 3: Identifying the Most Suitable Commercialisation Path

In this regard, Professor J and K specifically highlighted the need to have a systematic plan of action. Considering the dynamism of the innovation, Professor J emphasised that the technology itself is not important. However, the more important aspect is having a systematic process of positioning the technology in the market. According to him

the product will also change because R&D is always dynamic. You will have new input, new ideas, new things come up. Then, you will have to re-align your strategy and the product will also evolve into something else. The product itself can change in accordance to the market needs.

Professor K further highlighted the importance of having strategic sales and marketing approach to ensure a sustainable business of product innovation. According to him,

Generally, it is marketing and sale that make or break the business sustainability.

The novelty of the product contributes perhaps a maximum of 30 to 40 percent, the other 60 percent comes from other activities especially the marketing and sales of the product”.

He added that understanding of the position of our solution in the eco-system of the industry and in the supply chains is very important to help identify the best marketing approach.

Establishing Networking

Establishing networking with the industry people also contributes to the success of commercialisation. The four researchers suggested that researchers consult prominent people in the industry and those who have connections, such as those with the positions of Chief Executive Officer (CEO), Vice President (VP), key players in the product ecosystem, end-users, and customers. These prominent people can identify potential buyers or business partners as they are familiar with the technology and eco-system. Professor F suggested researchers to participate in conferences and initiate visits to the relevant industry to promote one’s technology innovation. He admitted that he normally secures his business through his contacts with the industry people. Additionally, he builds his good reputation to maintain relationship with them. For him, trust and name are crucial in building reputation and it cannot be exchanged with monetary.

There are also cases whereby the business partner or buyers are introduced by friends and colleagues. Professor H particularly claimed that in most cases his industry partners are introduced by his circle of friends. In this case, Professor F and H emphasised the importance of building good rapport with friends and colleagues since they can become researcher’s introducer. For beginners, Professor F further suggested that they should focus on making contacts with small or medium size business entrepreneurs, rather than rich and large size companies. Based on his experience, the big-size business entrepreneurs are very seldom able to entertain small-scale R&D product commonly developed by researchers. Researchers need to show a good track record of their product to gain good reputation from the industry.

Conclusion

This paper focuses on the five determiners that contribute to the success of commercialising technology innovation in Malaysia. The five determiners are the innovator or champion, business partner, product or technology itself, commercialisation path and networking. It is important to highlight that these factors are interdependent with each other in achieving successful commercialisation of a technology innovation. These elements need to be considered when aiming for a sustainable commercialisation of a research product in Malaysia.

It is timely to highlight that the framework of successful commercialisation of the technology innovation advocated in this paper is primarily based on the practical experiences of four Professors who have successfully commercialised their technology innovation. However, experiences of business partners working with the academic in commercialising the technology will also provide valuable knowledge on the commercialisation of the technology that involve the two worlds: the world of researcher and the world of business. Further, more policies imposed by the university and government can also be included into the picture.

The commercialisation of technology innovation in Malaysia is still progressing but at a slow pace, although much emphasis have been given at the university as well as at the national level. The four researchers are among the few researchers that have managed to commercialise their products. They are the exemplars of entrepreneur researcher and they can play the role as mentors for academic other researchers who are starting to commercialise their technology innovation. In this regard, the experiences of the four professors in commercialising their technology innovation products has been documented in a book entitled “Wealth Creation from Commercialisation of R&D Product: Real Life Experiences of Malaysian Researchers”. It is expected that the success stories of the four Professors can be used as guidance and inspiration for more researchers to become successful technopreneur in future.

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