

Challenges for Research Product Commercialisation: A Case of Malaysian Academic Researchers

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Abstract: Research product commercialization have become the main catalyst for wealth creation of a country. In Malaysia, commercialisation of research products especially from the university has been recognised as the source of income. There are many supports have been put forward by Malaysian universities to encourage academic researchers to commercialise their research products, however, the rate of success is still less satisfactory. The purpose of this study is to discuss the challenges faced by four award winning academic researchers in commercialising their research products. Interviews were conducted with four Malaysian academic researchers who have successfully commercialised their research products. The study identified that there are challenges with respect to funding, manpower, marketing strategies. The most challenging factor is the knowledge and skills gaps between industry and academic researchers. Findings of this research can be used as guidance for academic researchers to plan strategically for a successful commercialization for their research products. These findings are also valuable for policy makers at the university and the government to improve the success rate of research product commercialisation in Malaysia.

Key words: Commercialisation, research products, academic researcher, encourage academic researchers, product commercialisation

INTRODUCTION

Commercialisation of research products acculturates innovation to achieve high income nation status in Malaysia. Universities, research institutes and government have provided some supports to improve commercialising activities from research products. However, commercialisation of research products among academic researchers is relatively new and there are little findings to support commercialisation activities in Malaysia. Furthermore, these issues have not been properly addressed. Commercialisation of research products is also a complex process and there is no single approach that fits to guarantee its success.

In Malaysia, research universities have been perceived as the pioneer and a catalyst for research commercialisation. There are various functions for research product commercialization for example it boosts economic activities (Dietz and Bozeman, 2005) and it creates new jobs opportunity (Di Gregorio and Shane, 2003; Perez and Sanchez, 2003).

It is a critical issue to discuss on the research commercialisation and it is especially relevant for the university-based technology. The value from the technology commercialisation depends very much on what happens before the product is being developed. Thus, it is encouraged for academic researchers to embark for commercialisation at the beginning of their research endeavors. It is important to note that research products created must consider the needs of industries and they are significantly relevant for the private sector (Powers and McDougall, 2005; Agrawal and Henderson, 2002; Nicolaou and Birley, 2003). Generally universities and research institutions play significant role in facilitating the creation and commercialising of the research products or Intellectual Property (IP) (Siegel and Wright, 2007). Thus, universities and research institutions have been regarded by policy maker as an engine for economic growth through commercialisation tools (Markman *et al.*, 2008). Furthermore, university should bridge the gap between science and technology into entrepreneurial ways by commercialising researcher's products (Phan and Siegel, 2006).

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Universities have different options to commercialise their research products. 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 (Siegel and Wright, 2007). Moreover, a strong collaboration between universities, research centres and other organisations must be emphasised to pursue towards research products commercialization (Siegel and Wright, 2007). This fruitful efforts must be recognized by granting appropriate rewards or incentives for academics so that commercialisation activities are more valued (Siegel *et al.*, 2007).

Effectively for research product commercialisation, university will adopt commercialisation policy and other key legislations to promote rapid diffusion of technology from universities to industries (Markman *et al.*, 2008). For example, IP commercialisation policy has been designed to consider the ownership rights, profit sharing and other rights (Ab Aziz *et al.*, 2011). These policies are important to establish proper management of Intellectual Property Rights (IPRs) and protect research product commercialisation related processes. Moreover, these policies are intended to provide support, guidance and framework to enhance researcher's productivity (Ismail *et al.*, 2014). Other than research commercialisation policy, research management centre or technology transfer office plays an important role to develop, coordinate and facilitate commercialisation in universities.

Although, many initiatives have been put forward by the government to accelerate the rate of commercialisation but the success is still not satisfactorily achieved. There are challenges to bring research products from university to the market. In the agricultural based research for example although there are much potential for universities to be actively involved in commercialisation, however farmers are not readily convinced to consider using technology developed by universities (Holliday, 2007). For small firms, it was difficult to pursue commercialisation because they are not aware of IPRs system and high cost involved when using the system (Siegel and Wright, 2007). Further more, there was a problem to link between academic and industry, due to the tacit nature of knowledge. Industries consider that the university is not a source of innovation and this perception needs to be changed. Other related challenges for research product commercialisation including lack of funding, lack of collaboration between academic and industries, lack of emphasis on innovation and lack of human capital

(Harman, 2010). Although, there have been variety of incentives and rewards available for academic researchers to pursue their research commercialisation, these provisions have not been systematically organized. Academic researchers have difficulties to identify the right incentives and rewards relevant to their research product.

This proved to be less motivational for researchers to undertake the commercialisation activities. Lack of expertise in the relevant field and lack of expertise in management skills are also identified as challenges for successfully commercialising research products. Based on this premises an understanding what challenges for the success of research products commercialisation is necessary. Thus, the purpose of this study is to discuss challenges for a successful commercialisation of research products among Malaysian academic researchers.

MATERIALS AND METHODS

Although, various supports have been provided by universities, the successful rate of commercialising research products is still at its low pace. Thus, this study addresses the following research questions:

- What are the challenges for research product commercialisation among academic researchers in Malaysia
- What recommendations can be made for the success of a research product commercialisation

In order to answer these questions, this study adopted a qualitative research using semi-structured interview questions. Four key academic researchers who have experienced in commercialising their research products have been purposely selected for the interview. The four selected academic researchers were from different technical and scientific background and they have successfully commercialised their research products. In this study, the four academic researchers are identified as Professor J, F, K and K for the purpose of anonymity.

The face-to-face semi-structured interview questions were design using the structure developed by Patton (2002). The interviews were conducted by the researchers and the sessions lasted approximately 1 to 1 half hours. The interviews were recorded and then transcribed verbatim. All information gathered from interviews were analysed based on axial coding. Due to rich data, a story of the four research academics was developed based on four main aspects; background of the researchers; strategies of commercialisation; supports received;

challenges for research product commercialisation and advice for successful commercialisation. The write up of the stories were sent to the respondents for cross-check and data validation.

RESULTS AND DISCUSSION

This study has identified and examined the main challenges for research product commercialisation which can be categorised into four aspects, namely sufficient funding, skilled manpower, marketing strategy and knowledge and skills gap between academics and industries. These aspects are discussed further in the following part of this study.

Sufficient funding: All of the four academics agreed that funding is one of the challenges for research product commercialisation in the university. Issues related to funding highlighted by the four academic researchers are summarised in Table 1.

As highlighted by all Professors, product commercialisation requires an extensive capital investment in developing the products. Researchers who decided for joint venture may not experience financial constraints as they are funded by interested company as claimed by Professor F. For this reason he suggested that government should take a proactive action by providing the sufficient funding for selective technologies. To encourage more research product commercialisation in the university, the government have to be selective in choosing products which have strong commercial value. Professor F emphasised that to secure more funding from industries and government agencies, researchers need to conduct both fundamental and applied research. In contrast, Professor K admitted that although government agencies allocate funding and grants (for example Malaysian Trade and Development Corporation (MTDC)) however, he claimed that these grants are mostly company-based or project-based whereas problems faced by newly set up companies are mainly process-based. He clarified.

Table 1: Issues related to funding

Issues	J	F	H	K
Product commercialisation requires extensive capital investment	✓	✓	✓	✓
Funding is not the main problem, if you are confident with your product			✓	
Government should take proactive actions to provide funding		✓		
Most government funding are company-based or project-based rather than process-based				✓
To secure funding, it requires both fundamental and applied research		✓		

The problem with funding is that when these people do the evaluation they evaluate the whole product, whereas our problem in the company is just at the process level. In a project there are many processes such as the process of idea and the process of development. So, we need to do testing several times and it involves a high cost.

Furthermore, Professor K admitted that product development involves cost to pay the expert but unfortunately, financial supports or grants to pay for their fees are nearly non-existence. On a different view, Professor H said that financial supports should not be considered as an obstacle for product commercialisation. The most important thing is that the academic’s belief and confidence towards his own product to be commercialised. He said: if you are really confident about your product, financial is not a problem. There are people who are willing to sell their house just to make the product. You need to have strong belief. Confidence is important when you are confident, you will the find money, make a loan.

Professor H and his research team used their own money and made a bank loan to develop a prototype that they believe to have some values in the market. Financial supports are identified as the most crucial issue in setting up a new company. Although, Malaysia is considered as among the best countries to offer financial supports for new entrepreneurs there are several improvements that can be made pertaining to this. First in addition to the project-based or company-based financial supports, there should be process-based financial supports be offered. Secondly, a special financial supports to hire expertise should also be created. Hence, researchers need to be creative in finding financial supports for their research products commercialisation. Academic researchers need to prepare themselves that the existing financial supports are not sufficient to support them (Yin, 2008). Thus, they have to work harder to secure financial support for their research.

Skilled manpower: Having skilled manpower is another challenge for research product commercialisation in Malaysia. Table 2 highlights issues related to manpower in commercialising research products.

According to Professor F, although he has received many opportunities to conduct research projects he was not able to take all of them due to lack of manpower. For this reason he had to be selective when doing his research. He clarified that “I am the only one, a few of technical worker staff and commercialisation, we cannot do it in this lab in much bigger scale of production line”. Due to lack of skilled manpower, the process of

Table 2: Issues related to manpower

Issues	J	F	H	K
Lack of skilled manpower limits the potential to take up a larger scale of production	✓			
Permanent, skilled and competent staff must be appointed to help for commercialisation	✓	✓	✓	
University should establish one stop centre to facilitate researchers	✓	✓		
Lack of flexibility with respect to researcher's mobility			✓	

commercialisation may be affected and this has limited his potential to take up a larger scale of production of his research products.

All of three Professors J, F and H agreed that permanent, skilled and competent staff must be appointed to handle and facilitate the research commercialisation in the university. This skilled person should be permanently attached to the centre and is responsible to manage all related activities pertaining to research products commercialisation in the university. Professor F said that: I would like support on the permanent research staff. I am not talking about lecturer but permanent research staff. The welfare and benefits of this group of researcher should be well taken care for their fully commitment to the university. When commercialisation is brought into our view, skillful personnel are highly needed.

Similarly, Professor J admitted that the officer who has been assigned to handle negotiation with the business partner lacked knowledge especially related to business related issues. For this reason he suggested that the university should set up a one-stop centre to facilitate researchers to commercialise their research product. The centre must have all required skilled and knowledge including soft skills to facilitate academic researchers in the real sense and a permanent skilled staff appointed must be competent to handle the centre not an another bureaucracy or entity that can only organise the meetings. Equally agreed, Professor H explained that that the university should have a creative manager rather than procedural manager to manage research commercialisation in the university. According to him, a creative manager is a risk taker and has the mindset of a businessman. Professor H further described manpower as lack of flexibility with respect to researcher's mobility back and forth between the academic and commercial settings. He explained that: there are things that need to be relooked especially the university policy related to commercialisation. Sometimes the policy becomes restrictions to researchers to move to work with their business partner. They should be allowed to be together in the company. Then when the commercialisation process is successful, allow them to return back to the university.

Researcher's availability in the academic context should be made flexible as this is one of the ways to

Table 3: Issues related to marketing strategy

Issues	J	F	H	K
Research products should tap the market needs	✓	✓	✓	✓
Researchers can adopt "reverse engineering" approach			✓	
Realign research commercialisation and product in a solid package	✓			
Innovation development centre and effective support group to conduct product development				✓
Market analysis should be given a priority at the beginning		✓		

ensure an increased success rate of the product commercialisation. By giving them the flexibility to mobile from one place to another place they can concentrate doing one task at a time.

Marketing strategy: One of the important challenges is to produce a product that has market potential and issues related to marketing strategies are highlighted in Table 3. All of the four Professors agreed that research products produced should meet the requirement by the respective industry. The products should tap the market need to successfully commercialise their research products. In order to make this effective, it can be done by making contacts with the industrial people during student's industrial visits and internships as explained by Professor H.

Furthermore, as Professor H suggested that researchers should not just adopt the conventional way of doing research: Begin with a proposal, design and test the prototype and develop the product. Rather they should adopt a "reverse engineering" approach of doing research. He emphasised that sometimes the research can begin with a finished product in mind. He said that "(researchers) should start with a target product that has commercial values and then work on their proposal based the visualised product".

Research and Development (R&D) is always dynamic and requires for new input, ideas and things as claimed by Professor J. Thus, researchers need to realign his strategy and his product in a solid package for commercialisation as he said that: At the end of the day, 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.

On the other hands, Professor K claimed that the failure of the product to enter the market is due to insufficient product development carried out on the product. The university does not have particular centre which provide the service. He suggested that university should set up innovation development centre and effective support group that can help academics to

conduct product development for their products commercialisation. Commenting the need to perform product development, Professor K emphasised that: the centre will be of a great help especially when the university wants to send R&D products for exhibition.

The centre that has a development team can help in designing and developing the product for commercialisation. The development team can come from different faculties. In this case, researchers do not have to waste their time thinking something which are not their expertise. Product development is considered one of the important processes that need to be conducted for a successful research product commercialisation. However, it is largely ignored as there are insufficient facilities and support teams available at the university setting. He further said that marketplace is unpredictable and risky and they may face stiff competition from other existing products in the market. Professor K further emphasised that they need to find the right person or business partner that can effectively market and sell their product in the market place. He emphasised that without marketing and sales, the product will not go anywhere.

The market analysis should be given a priority at the beginning of the project in order to ensure that the research conducted benefit the society. Professor F emphasised the need to scan through the areas of research interest before embarking in any of the research project and he suggested some critical questions that need to be addressed:

- What are the needs that products will serve in the market place?
- What are specific research areas the products involve?
- What are the market potentials?

According to him these questions are important to ensure that potential values of research does not only serve for the academic contributions but also serve to the betterment of mankind.

Knowledge and skills gap between academics and industries: The most challenging factor for research product commercialisation is the knowledge and skilled gap between academics and industries. Lack of common knowledge and understanding between academics and industry are depicted in Table 4.

All of them agreed that both industry and university do not seem to understand each other responsibilities and tasks. The interactions between them are not well bridged

Table 4: Issues related to knowledge and gap

Issues	J	F	H	K
Both industry and university do not understand each other responsibilities	✓	✓	✓	✓
Build networking and collaborate with industry	✓	✓	✓	✓
Researcher and industry must have the same “language”		✓		
Adaptability is needed to maintain the dynamic relationship with business partner	✓			
Good reputation must be built to maintain the relationship	✓	✓	✓	✓
Finding the right business partner is critical important	✓		✓	
Business partner to have basic technical knowledge	✓			✓
Academics must acquire both technical knowledge and business/entrepreneurial related skills	✓	✓	✓	✓
Policy that encourages the use of newly produced R&D product				✓

as claimed by Professor F. Thus, commitment from both parties is important for a successful commercialization. Thus, researcher and the industry must have the same “language” in order to understand each other as emphasised by Professor F. He said that: when you talk like an entrepreneur to the representatives from industry, the industry will question, “Can you sell the expertise. Can you make million out of that”.

I have faced and gone through all these. So, I analysed this situation. Now there are two different worlds. They are some professors making good income from this. On the other hand some are just professors who focus on teaching and invention. So, we need the bridge. Both researchers and industry do not have a common understanding as they are from two different worlds. Hence, a link needs to be drawn to ensure that both parties appreciate and understand each other’s goal for a successful research commercialisation.

Networking and collaboration with industry is inevitably important for academic researchers. Thus, building a good rapport and investigate what are the needs of the industry are important for researchers as agreed by Professor H. Nonetheless, researchers usually have difficulties to establish networking with the industry as they are more focusing on their teaching and conducting research. Professor K suggested that university should establish Industrial Advisory Panel (IAP) for research which serves as a platform for researchers to have direct contact with the industry and for the industry to share their industrial needs.

Equally important, Professor J stated that the main challenge is to maintain the dynamic relationship with business partner. He said that the main obstacle is to maintain the relationship. It is a dynamic relationship. It is like a marriage as well. You need 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. At the time of signing agreement, everything looks very nice and all that suddenly, there are new things popping up. So, my toughest task is to maintain the relationship to be in good condition and sometimes there are things that we need to adjust in order to move forward.

In order to maintain good relationship, adaptability is needed for the academic researchers to maintain good relationship with business partner. Professor J has developed a good rapport and trust with his business partner in order to maintain the relationship. Professor F said that good reputation must be built in order to maintain relationship with industry. Trust and confidence are crucial in building and maintaining reputation. According to Professor J in order to maintain good reputation with industries, academic researchers need to communicate with people in the area related to their expertise to find the best business partner. Finding business partner is very important in order to secure commercialisation grant. The right business partner has the right aptitude to market the product and technology. They are the one best suited to do market analysis for the research product. It is good to know the right business partner as he warned with few questions:

- How will they take advantage of my situation
- How do I guard my rights
- How do I guard my interests
- How will they take advantage of my situation

Professor H explained that academic needs to be careful and select a business partner that does not take advantage in any circumstances. The main determinant for a business partner is a partner who can work together and has common understandings. One way to determine the criteria is to use one's own senses; however to rely on one's senses tend to be subjective. Hence he suggested that academics to spend time with the business partner and read their body language (Payumo *et al.*, 2012).

On the part of business partner they should have acquired basic technical knowledge in the areas that researcher are working on for both sides to appreciate their roles as emphasised by Professor J. He further stated for academics they must acquire not only technical knowledge but also business related skills. They should prepare to face the real of the business world by adding their value of gaining other related knowledge and soft skills. For academic this knowledge is acquired beyond their R&D ecosystem and to convince people on how to secure support for their ideas.

Entrepreneurial and business related skills are a must for researchers to communicate the existence of their products to potential buyers and convince the significance of the products to market. This is highlighted by Professor F as he stated "entrepreneurial skill is an extra bonus to facilitate the communication with your clients". Professor H also agreed that it is not necessary for researchers to have wide and in-depth knowledge of business. The most important is sufficient knowledge of the business to protect them from being manipulated or tricked by irresponsible entrepreneurs. Hence, researchers can exert some bargaining power when negotiating with the business partner. Professor H admitted that initially he did not know anything about business but he learned about business by taking parts in almost all of the business operations involved in commercialising his R&D product.

Professor K has also agreed that to market and sell research product required competencies in entrepreneurial and communication skills. He thinks that majority of researchers do not have sufficient entrepreneurial skill. This is understandable as most of them operate in the academic world where the focus is mainly on teaching and researching. Furthermore, the need for entrepreneurial skills for academics researchers have only been considered important as universities are moving towards independence as they have to generate their own income. For researchers to be successful in commercialising and achieving sustainable business for their R&D products, it is crucial for them to have sufficient knowledge of entrepreneurial skills. According to Professor K to be an entrepreneur, "one needs to have a business knowledge and very good at it and also need to be a motivator".

Researchers need to bridge to the business world so that they can understand the problems faced by their business partner and negotiate their interests. However, the success of a product 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. By doing so, both parties will be able to understand each other and they can build common goals toward achieving successful product commercialisation.

CONCLUSION

In summary, this study concludes there are many initiatives provided by the university to facilitate in improving research product commercialisation among academics in Malaysia. It is significantly emphasized that commercialisation involves a very long and tricky process

which requires high investment. Academic researchers should expect that there are many challenges for commercialising their research products. Firstly, limited funding available which required them to take own initiatives to pursue that their products are worth for commercialisation. Secondly, lack of skilled manpower in dealing with commercialisation related matters which demanded academic researchers to do all their jobs.

Thirdly, marketing analysis should be done to ensure that their products tap with the industrial needs without which it will limit the penetration of academic products into the market segment. Finally, there are huge gaps between academic researchers and industry in terms of knowledge and skills which requires a link to bridge the two. Thus, this study aims to make some recommendations to facilitate for better improvement of research product commercialisation in Malaysia. Rather than focusing on traditional teaching and learning per se, university's functions should also focus on commercialisation activities. University should play an effective role to develop and cultivate entrepreneurial academics. Thus, academics should not only focus on their scientific or technical knowledge but they have to acquire knowledge related to business and management; whereas industry should acquire sufficient knowledge related to technical and scientific to develop a common understanding. Furthermore, a clear and focused function of the research management centre or technology transfer office should be enhanced in terms of their organisational structures to facilitate commercialisation activities in the university. Furthermore, the skilled, permanent and competent personnel must be appointed according to their expert areas to assist for research products commercialisation including business, management, legal and intellectual property. Platforms for common understanding should be made available and accessible for the university and industry to collaborate to sustain the entrepreneurial university setting which benefits both parties. Academic researchers also should believe that limited funding do not discourage them to embark into commercialisation activities. In fact, this should be taken as an opportunity for them to produce quality and marketable products that can penetrate not only the national but also international market. The most important part is that they should have a strong belief and confident that their products are good for commercialisation.

Furthermore, available funding should not focus only project based or company based but it should be made available too for process based project. Furthermore, this creative and proactive action will drive them to achieve

academic entrepreneurs. Perhaps, acknowledgment and recognition from the university should be highly considered to boost and encourage for research products commercialisation among academic researchers.

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