

## Factors of Successful Collaboration in Commercialising Research Product between University and Industry: A Review

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**Abstract:** Within the context of knowledge economy, commercialisation of research product has become an important agenda both for the nation as well as the university. University as the center of innovation has been recognised as an important agent in cultivating economic growth of a nation. Similarly with the reduced dependency on the government funding, universities recognise commercialisation of research products as their source of income generation. While commercialisation has been considered significantly essential, important, however the activities of commercialising research product is still at an unsatisfactory level. One of the main hurdles in commercialisation of research product is the lack of collaboration between the university and the industry. Thus, this study aims to review existing literatures regarding the factors that facilitate the collaboration between university and industry in commercialising research product. For this purpose, 10 papers, retrieved primarily from Science Direct, ELSEVIER and Google scholar databases have been reviewed. It was found that broad range of interaction, mutual trust, government support, adequate funding, effective communication and good experiences are critical factors which help collaboration between university and industry. Hence, this study hopes to give valuable insight for university to plan their strategies in commercialising research product.

**Key words:** University, industry interaction, research product commercialisation, economic growth of a nation, dependency on the government funding

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### INTRODUCTION

Traditionally, teaching and conducting research have been perceived as prevalence roles in universities. However, now a days, the circumstances have changed gradually with the emergence of various disciplines such as information technology, biotechnology and nanotechnology. In a competitive globalized world, universities are increasingly being recognized as one of the critical components in developing country through knowledge based economy or also known as k-economy. With the increasing activities in commercialisation of research product, universities are considered as catalyst for wealth creation of a country as they contribute largely to the country's economic and development. Besides, the continuous production of research product for commercialisation has given rise to the recognition of a new model for university, known as the "entrepreneurial university" (Ramli *et al.*, 2013; Karlsson, 2004; D'Este and Perkmann, 2011). This recognition eventually benefits

universities to become an independent body that able to generate their own income without having to rely on government sources (Ramli *et al.*, 2013; Han and Heshmati, 2013).

University and industry collaboration serves as a strategic cooperation that gives mutual benefits to both. University and industry are dependent to each other where university generates knowledge and produce talent to meet industry requirement and industry requires the knowledge and talent in order to keep abreast with new technological advancement and maintain competitive advantage. In this situation, many universities have developed a "third mission" (Gulbrandsen and Slipersaeter, 2007) that is fostering linkages with industry to facilitate the technology transfer between university and industry (D'Este and Perkmann, 2010; Gulbrandsen and Slipersaeter, 2007; Aziati *et al.*, 2014).

Although, many universities have fostering link with industry, study revealed that research product from

university is not successfully commercialized or transferred to industry. One of the reasons is due to the weakness of collaboration between university and industry. Universities which are the center of the best mind and consist of experts in various field of specific knowledge are vaguely known to industry and not fully utilized for the betterment of the society (Ramli and Zainol, 2013). This weakness of collaboration make research product from university is difficult to be commercialized.

Establishing collaboration with the industry is not an easy task and universities are facing significant challenges to commercialise their research product (Bruneel *et al.*, 2010) as this type of collaboration is generally driven by different motivation, priorities and culture (Fiaz and Naiding, 2012; D'Este and Perkmann, 2010; Aziati *et al.*, 2014; Ramli and Zainol, 2013; Lind *et al.*, 2013). With respect to different priority, most researchers prefer to deliver knowledge and publish their research results, whilst industry tends to keep the research findings secretly to avoid their rivals from gaining the information (Aziati *et al.*, 2014; Ramli and Zainol, 2013; Fiaz and Naiding, 2012). Further, the conflicting understanding between the two parties makes it difficult for them to establish trust with each other (Othman and Malek, 2012). In addition, the industry generally does not believe that the university manage to deliver their work on time as they expected because a lengthy work duration may affect the industry staffs to lose their jobs (Barnes *et al.*, 2002; Othman and Malek, 2012; Othman, 2011). As compared to some researchers, industry players manage to work extra time for example, for three days without proper sleep just to complete their task (Othman, 2011). The different work's commitment of the university community and industry may also lead to the lack of trust among industry partner towards academic researcher (Othman, 2011) as commitment is very important for collaboration (Barnes *et al.*, 2002).

There are some gaps exist between university and the industry which require efforts to bridge the two worlds. Thus, Malaysian government has emphasized to strengthen industry and research collaboration under the 10th Malaysian plan in 2011-2015. Besides, government has also taken actions to foster collaboration between university and industry. For example, in 2011, Knowledge Transfer Program (KTP) was introduced (Salleh and Omar, 2013; Aziati *et al.*, 2014) to broaden industry experience among faculty members. Government also produce a book entitled "R&D Products of Universities in Malaysia 2013" to promote and introduce research product from universities in Malaysia to industry

community and society. The book acts as a platform to encourage commercialisation of research product from universities. Moreover, to show the importance of research commercialisations, various grants and research funding have been offered by the government such as Fundamental Research Grant Scheme (FRGS), Long Term Research Grant Scheme (LRGS), Exploratory Research Grant Scheme (ERGS) and Prototype Research Grant Scheme (PRGS), Transdisciplinary Research Grant Scheme (TRGS), Research Acculturation Grant Scheme (RAGS), Geran Sanjungan Penyelidik (GSP) and Niche Research Grant Scheme (NRGS). These fundings are hoped to increase and benefit research innovation and commercialisation of research product from university to the industry.

The involvement of government, university and industry is seen as a balance ecosystem and strategic approach to enhance economic and social development. The collaboration of university, industry and government is symbolized in the Triple Helix model (Etzkowitz and Leydesdorff, 1995; Safiullin *et al.*, 2014; Viale and Ghiglione, 1998). Triple helix model is a metaphor for university, industry and government to cooperate while each of entity maintains its independent identity. The model attempts to capture the transformation of roles and relationships that emerge from the three independent dimensions; from university, industry and government (Etzkowitz, 2003). There are different circumstances will arise from such convergence of different roles (Viale and Ghiglione, 1998) including:

- Enable academic researchers to become entrepreneur for their own technologies
- Enable entrepreneurs to research in a university laboratory or technology transfer office
- Enable public researchers to spend time working in a company
- Academic and industrial researchers collaborate to manage regional agencies which responsible for technology transfer

These converging roles of different dimensions are depicted in Fig. 1. Triple Helix-Field Interaction Model. According to this model, university which is considered as the center of academic based research, industry as the entrepreneur for commercializing the research product and government as policy maker. The collaboration of the three entities enable to bring research product commercialisation to a more successful level. The well integration of the three worlds ideally will increase the knowledge spillovers and trigger more quality of the research innovation.

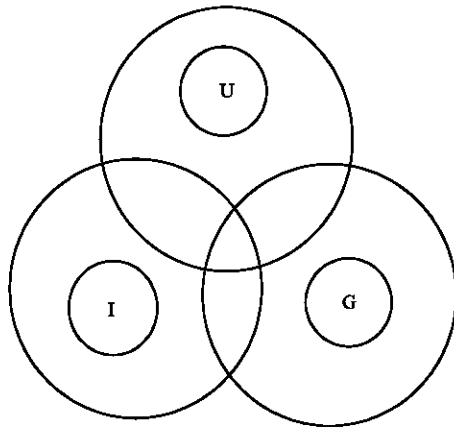


Fig. 1: Triple helix-field interaction model

Research product commercialisation benefits university and industry in achieving their mission. Although there are many barriers in commercialising research product, a good cooperation between university and industry helps in increasing the understanding of both parties and facilitating the commercialisation of research product. Besides, supports and encouragement by government can also be a kick-start for university and industry to actively play roles in collaboration activities. Thus, this paper aims to investigate the factors that contribute to the success of collaboration between university and industry in commercialising research product.

For the purpose, this study is organised in four sections. After the introduction section, this study describes the research methodology to capture the findings. The third section reports on the findings and present the discussion of the study. Finally this paper ends with a conclusion that there are six factors contribute to the success of research product commercialisation which are mutual trust government support good experiences effective communication, adequate funding broad range of interaction.

**MATERIALS AND METHODS**

The aim of this review study is to identify the factors contribute to the success of collaboration between university and industry in commercialising research product. The following procedures were conducted as shown in Fig. 2 to ensure that relevant literature are included in the analysis.

The empirical studies were searched by using search engine including Science Direct, ELSEVIER and Google scholar database. The search keyword used were “research product commercialisation”/“collaboration of

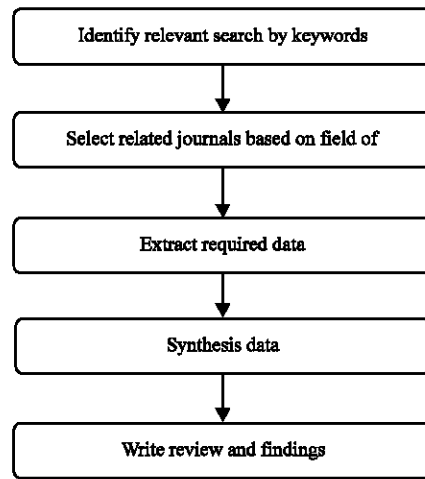


Fig. 2: Research method

university and industry”/“technology innovation”/“technology transfer”/“collaboration of university and industry”+“university research product”/“collaboration” /“factors of collaboration”/“factors of technology transfer”/“factors of research product commercialisation” to ensure all related papers are included.

The initial search based on the keyword “research product commercialisation” has resulted of 205 thousand papers. By examining the title and abstract of the primary identified papers, this study has excluded most of the papers due to irrelevant topic found in the papers. There are 50 papers during the second activity of selecting primary studies which are similar to this field of study. At the third process, this study accessed and evaluated the papers by checking the content of the studies. At this stage, irrelevant studies were rejected whilst relevant studies were examined further.

Out of 50 papers, there are only ten papers found similar to this content of reviewing. Next, the following data was extracted from the ten papers the objectives, methodology of the studies the results presented. The extracted data were carefully reviewed and analyzed. This study reported the findings based on the literature search.

**RESULTS AND DISCUSSION**

The brief finding of the review is shown in Table 1. There are many factors contribute to the success of collaboration between university and industry in commercialising research products. As shown in Table 1, this study found that there are six critical factors to be reviewed and analyzed. These factors are mutual trust government support good experiences, effective communication, adequate funding and lastly broad range of interaction.

Table 1. Summary of factors for successful collaboration between university and industry

Authors	Mutual trust	Government support	Good experiences	Effective communication	Adequate funding	Broad range of interaction
Plewa <i>et al.</i> (2013)	✓				✓	✓
Kaymaz and Eryigit (2011)		✓	✓	✓		
Fiaz and Naiding (2012)	✓	✓		✓		
Bruneel <i>et al.</i> (2010)	✓		✓			✓
Ramli and Zainol (2013)	✓		✓	✓		
Karlsson (2004)		✓			✓	
Barnes <i>et al.</i> (2002)	✓		✓	✓		✓
Decter <i>et al.</i> (2007)		✓		✓		
Khademi and Ismail (2013)					✓	✓
Meigounpoory and Ahmadi (2012)		✓	✓			✓

This study found that five out of ten agree that mutual trust, government support, good experiences, effective communication and broad range of interaction are the most common factors studied in the existing literature. Mutual trust is importance to facilitate the collaboration activities in research product commercialisation. This is because by having mutual trust, it will convince the partners to resolve any problems that may arise jointly and will treat them fairly. It also helps to sustain the university and industry collaboration and stimulates the exchange of valuable knowledge and information.

Besides, government support is another factor contributes to the success of collaboration in research product commercialisation. This is because funding support, rewards and recognition, policies regulation encourage the collaboration between university and industry in commercialising research product and simultaneously increase the rate of innovation in the country.

Apart from that, good experiences of academic researcher with business partner also play significant role in commercialising of research product towards the success of collaboration between university and industry. This is because good experience of collaboration will lead to another activities which may benefit both parties. Besides, prior experiences enable them to tackle any risk and uncertainty that may arise from the collaboration processes and increase the understanding of each other.

In addition, effective communication is an imperative factor towards successful collaboration in research product commercialisation. This is because some of the academic researchers are having difficulties to interact and communicate effectively with industry which may affect the performance towards commercialising research products. Thus, proper and effective communication are important instruments to facilitate the collaboration and increase the understanding of the two parties.

Besides, the way of interaction is another factor that needs to be focused in order to foster the link between university and industry. There are many ways of interactions such as face-to-face and open-ended

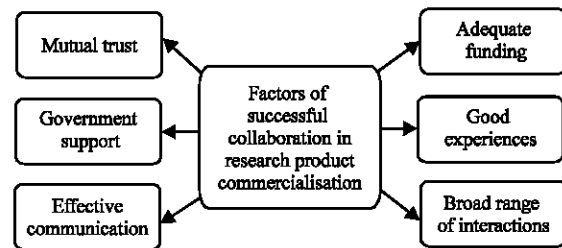


Fig. 3: Factors of successful collaboration in research product commercialisation

interaction. The different interaction gives different impact to the relationship in order to strengthen the relationship of both worlds. With regard to this, conferences, exhibitions and other interactive programs are considered as the best places to create opportunity for interaction and allow academic researchers to exchange contact with industry and leveraging their network.

Lastly, based on the reviewed papers, four out of ten agreed that adequate funding is another crucial part in commercialisation of research product. This is because, in order to achieve academic research outputs, certain sum of research funding is required. Initial investment usually is required to test the feasibility of the product before it able to make profits. Thus, funding is one of the factors for university to collaborate with industry as they are another sources of funding in doing research instead of government funding.

Based on the analysis, six factors have been identified as the factors contribute to the success of collaboration between university and industry in commercialising their research product. As shown in Fig. 3 these factors are mutual trust government support good experiences effective communication adequate funding broad range of interaction. All these factors need to be highlighted and focused in order to ensure the research product is no longer ends through publication of finding only but it continuously flow into commercialisation activities.

## CONCLUSION

This study focuses on six factors which contribute to the success of collaboration in commercialising research product. The six factors are mutual trust, government support, effective communication, adequate funding, good experiences and broad range of interaction. It is important to highlight these factors are important strategies for commercialisation of research product. These elements also need to be reviewed and revisited by university and industry from time to time to ensure sustainability of collaboration between both parties. Thus, it is important for university and industry to actively play roles in collaboration activities in the quest of commercialising research product. The sharing ideas and knowledge between the two entities are expected to give more brilliant ideas and innovative product as their skills complement to each other.

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