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**UNIVERSITY-INDUSTRY-GOVERNMENT COLLABORATIVE
RESEARCH IN MALAYSIA:
AN ANALYSIS OF TRIPLE HELIX MODEL**

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Abstract

The Triple Helix (TH) Model explains how the UIGs should work together as a team to create innovation and successful outcomes. However, due to differences in objectives, functions and mechanisms, such collaborations are difficult to form and sustain. The purpose of this paper is to document the perceptions of stakeholders involved in the Malaysian-based UIG collaborations, with respect to their strategic partnerships, under the coordination of the intermediary organization, Collaborative Research Engineering Science and Technology (CREST). A qualitative research based on semi-structured interviews and document analysis, was conducted to capture the manifestations of strategic partnership in each of the stages of the TH. Three particular themes surfaced within each stage of TH, namely, partnership evaluation, building relationship, and synergy in collaboration. In the partnership evaluation stage, the respective partners were interested to match their expertise with those of others and improve their own competitiveness, while in the building relationship stage, a trust-based relationship is expected to be of mutual benefit for all. In the last stage, transparency and facilitation become important in order to accomplish each of their respective goals. The role of the intermediary organisation across the stages builds from being a filter and legitimator and technology broker, toward providing resource support and funding. Nevertheless, its role as a mediator/arbitrator was poignant throughout all the stages.

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Keywords: Strategic Partnership, UIG collaborative research, Triple Helix Model, Triple Helix System.



1. Introduction

This research stems from Malaysia's long-held concern with the perceived view of the lack of collaboration among UIG. Therefore, the government made several initiatives to promote industrial innovation, such as providing incentives, supporting consortia and clusters, public-private partnerships, and promoting science-industry linkages and knowledge transfer. Furthermore, the government has allocated funds (e.g. TechnoFund, ScienceFund, InnoFund, Technology Acquisition Fund and others from various agencies and ministries) for public R&D estimated around 0.46% of its GDP. However, the commercialization output was considered unsatisfactory (Rasiah & Govindaraju, 2009; Chandran, Sundram, & Santhidran 2014).

Chandran, Sundram, & Santhidran (2014) conducted a study on the level of University-Industry (UI) collaboration in Malaysia where it revealed there was R&D gaps exist between UI. It described that the university engaged in basic and fundamental R&D while the industry engaged in incremental innovation which requires less R&D investment. In addition, the study also disclosed factors that contributed to the level of UI collaboration such as lack of an intermediary role, absorptive capacity and collaborative initiative by the industry. Chandran et al. (2014) suggested that collaborative R&D can be a good effort to increase the commercialisation output, but it requires close cooperation between UI and a proper institutional arrangement in coordinating the collaborative R&D.

University-Industry-Government (UIG) collaborations are important within the context of the ultimate collective synergy created and innovative outcomes of the strategic partnership. Within the context of the Triple Helix System (THS), there is a lot to uncover and understand how dynamic relationships are formed and what constitute key factors of successful collaboration. What is more interesting is when one contextualises the role of an intermediary organisation such as CREST in facilitating the success of UIG collaborations. This research investigated such unique set-ups of UIG collaborations, and analysed the process of strategic partnership, which manifested within a TH system.

2. Problem Statement

Scholars argued that TH failed to provide a complete picture of the collaboration process (Tummons, 2014; Villarreal & Calvo, 2014). Some of the arguments include there is a need to uncover the innovation which involved in the TH which helps to improve the economic competitiveness. While the TH is an important topic to be explored because it needs to provide a better description of UIG collaboration to a concept of strategic partnership. Furthermore, TH denotes a synergy among UIG that represents the key elements of the innovative system. Consequently, this paper plans to present the complete picture of strategic partnership by using TH which incorporate main important factor for a successful partnership to turn into an innovation that drives the economy in the long run (Verlinde & Macharis, 2016; Vertakova, Grechenyuk, & Grechenyuk, 2016).

While the TH model is known to be applicable in advanced nations, where, university-led collaborations are evident, its applicability in developing nations are seemingly new and does not necessarily reflect the true nature expected of TH model applications. Nevertheless, in such government-led UIG collaborations in Malaysia, it is vital to understand how a successful TH model work, and what it

would take for such UIG collaborations to succeed, under such environment. This research studied a Malaysian-based UIG collaborative strategic partnerships, under the coordination of the intermediary organization, Collaborative Research Engineering Science and Technology (CREST).

There are many discussions about TH which focus on the individual elements and attempt to manage the whole collaboration process, however, the relevance of intermediary organization in TH especially in developing country become one of the focus areas in this paper. It has become one of the challenges for intermediary organisations to manage the partnerships with dozens of companies and promote each expertise and capability towards innovation and competitiveness. Since there were an insufficient support system and policy to stimulate the collaboration process in Malaysia, therefore, the government has established an intermediary organization which helps to harness the initiative under government agencies and collaborative issues among UIG. With the increasingly competitive global market demand for innovative products, the effective collaboration needs to be acknowledged where the factors associated the collaboration and activities during the collaboration need to be identified in order to build a better collaboration and establish a strategic partnership and innovation (Salvador, Mariotti, & Conicella, 2013).

Therefore, a case study of UIG collaborative researches within the opto-electronics research cluster, facilitated by CREST was selected for this research. These UIG collaborations were unique as it represent amongst the very few which involve the intervention of an intermediary organisation in Malaysia (CREST, 2012). Although CREST was established for six years, the collaboration among its memberships has never been studied before in terms of factors, activities, and its roles in facilitating the strategic partnership. This raises the questions of - What makes a good strategic partnership? How intermediary organisation help to stimulate the strategic partnership? How can innovation be achieved? Therefore, there is a need to explore the strategic partnership concept and innovation which are being practiced by all the stakeholders involved in the CREST's engagement.

3. Research Questions

The research objective was to analyse the TH model underlying UIG collaboration which is facilitated by an intermediary organization. Therefore, the research questions were: 1) What are the factors motivating UIG to collaborate and what activities are involved within each stage of the TH model? 2) What role does the intermediary organisation play throughout the stages of collaboration?

4. Purpose of the Study

The TH emphasize the interaction and integration between three institutional spheres which can generate new institutional linkages and relationships (Alshehri et al., 2016). Furthermore, each institutional sphere is not only able to perform its core functions but able to integrate with other roles and play non-traditional roles which create the source of innovation (Etzkowitz, 2008). Etzkowitz (2011) described three stages involved in the development of TH interactions. The formation of a hybrid TH involved 1) internal transformations 2) the creation of bilateral network and 3) the creation of tri-lateral network (Etzkowitz & Dzisah, 2008; Etzkowitz & Leydesdorff, 2000). Therefore, the research aims to analyse the TH model underlying UIG collaborations which are facilitated by an intermediary organization. Therefore, this paper

explains the process of strategic partnership within TH analytical three-stage framework which forms a TH system and the how intermediary organization could help to stimulate the collaboration process. The research framework (Figure 01) provides an overview of the concepts used throughout the research.

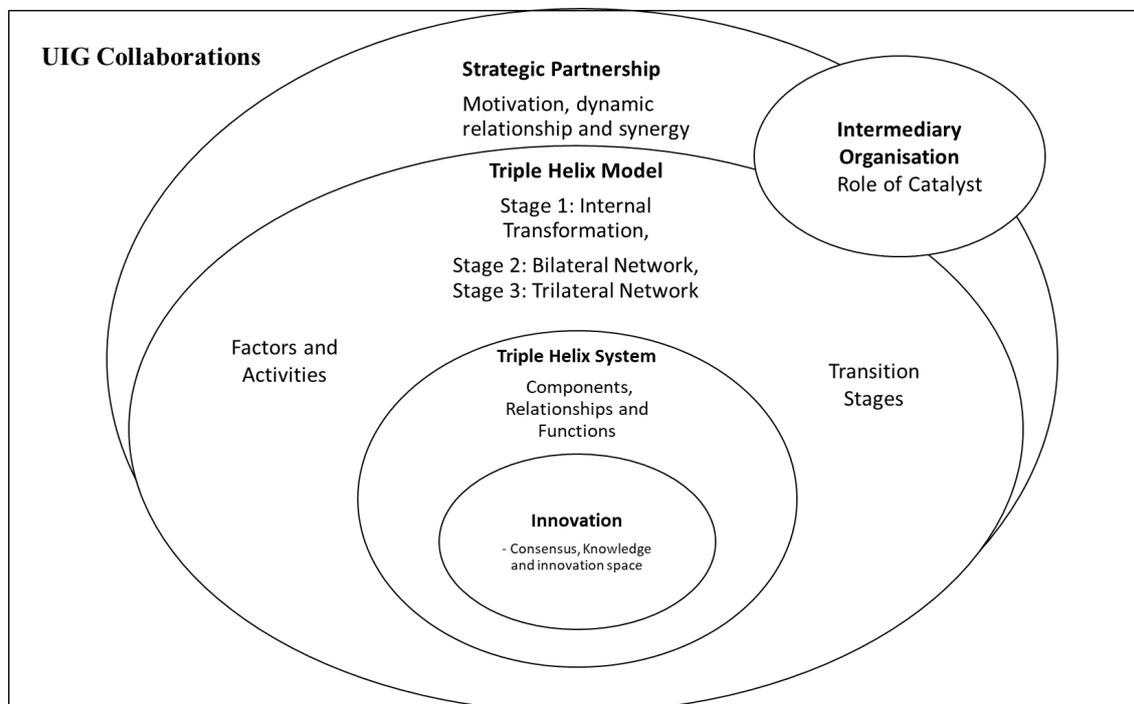


Figure 01. Research Framework

The rectangular diagram represents the context of the paper which is UIG collaborations and the circles represent the element and concept used in the paper. The main concept is strategic partnership which related towards motivation, dynamic relationship, and synergy in the collaboration. It is within the strategic partnership context that TH model is investigated, consisting of triadic relationships among UIGs. The TH process starts with stage 1: internal transformation, moving on to stage 2: bilateral network and, finally reaching stage 3: trilateral network. In addition, the researcher anticipated gathering information on the factors motivating each partner towards the collaboration, in each stage, and the ensuing activities, and the context of how the intermediary organisation, as an external agent, plays a role throughout, and especially, during the transition stages. Moreover, the factors and activities are the crucial information which affected the decision-making process and activities underlying each stage. Moreover, the transition phase describes the transition activities that lead towards entering a new phase.

Additionally, THS helps to further elaborate on the TH model. THS is a theoretical/ analytical construct defined according to systems theory as a set of components, relationships and functions, are used to explain the innovation emerging from the interaction of processes (Etzkowitz & Ranga, 2013). Moreover, the THS discuss on the innovation system which derived from the flow of information among UIG in the innovation process which started with consensus, knowledge and ultimately innovation space.

5. Research Methods

The researchers have adopted a qualitative research throughout the research process which mainly involve primary data (in-depth interview) and secondary data (documents). This paper used a case study method because it adopted descriptive and exploratory research design. The research process started by reviewing the available literature where researchers carefully examine available knowledge and theory, carrying out a thorough literature search that includes up-to-date information on the topic of investigation (Elliott & Timulak, 2005). The sampling of research was based on opto-electronics which was one of the research clusters identified by CREST. The researcher decided to adopt the in-depth interview throughout the research period because there is little information about the topic known and it is important to gain an in-depth understanding (Qu & Dumay, 2011). The interview questions took five months to complete from January 2018 until May 2018. A total of 18 interviews were conducted with industry (e.g. managerial level and above), university personnel (e.g. researchers) related government agencies personnel (e.g. managerial level and above) and CREST top management.

The data was analysed and triangulated to improve the trustworthiness, validity and reliability of the research. Document analysis of data retrieved from archival records (public records which included published reports, mass media reports, as well as websites) is used by the researcher for triangulation process, to corroborate the in-depth interview findings, surrounding the assessed topic related to the TH model (Martinsuo, 2001). By scrutinising the documents, the researcher incorporated the relevant and similar content into the themes analysed (from the in-depth interview transcripts). Finally, the finding justifies the by explaining in detail the interaction using TH system. Therefore, the data was identified and coded according to their respective segments of data. Then, the analysis of categories coded concepts, factors or events helped to provide some answers to the research questions raised by this research.

6. Findings

The result showed in Figure 2.0 described the UIG collaborative research where each circle/sphere described stakeholder involved, while the circle's content signifies the factors affecting the stakeholder's decision to move towards the collaboration. This provided a complete picture of what happened in the program and why such things happened. Figure 2.0 shows nine main factors emerged from the data analysis in relation to TH transition process. Two factors supported stage 1; 'complements each other' and 'improves competitiveness'. In addition, three factors supported stage 2; 'expectation of mutual benefit', 'trust-based relationship' and 'professional culture'. Finally, four factors supported stage 3; 'clear goal', 'commitment', 'facilitating collaboration' and 'transparency'.

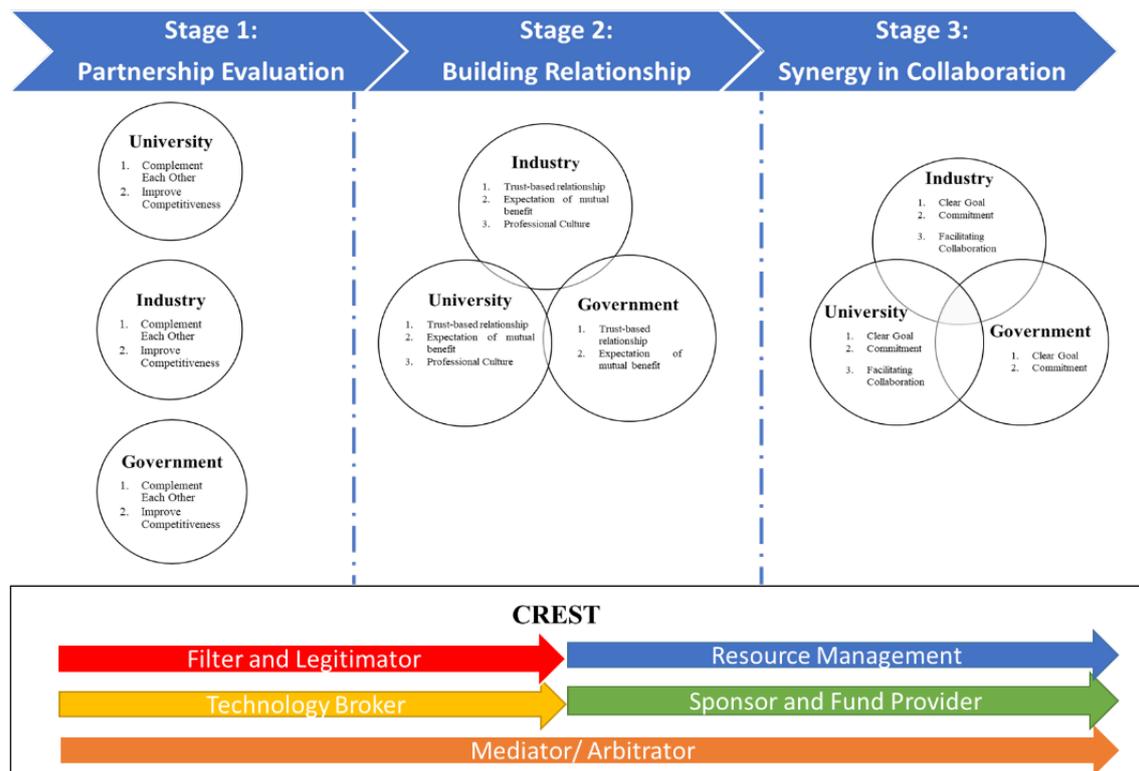


Figure 02. The Overview UIG Collaboration with the Integration of CREST

Stage 1 revealed the important factors which contribute towards the needs of stakeholders involved in the strategic partnership. At this stage UIG was concentrated on the “single sphere’ and separated from each other. This indicated there was no direct interaction among spheres at the initial stage. Based on the findings, each sphere evaluated their intention to enter the partnership separately and revealed that there were two factors affected the decision making of each sphere to enter into a collaboration which ‘complements each other’ and ‘improve competitiveness’. Therefore, partnership evaluation was the first theme derived from the findings. In addition, each component determined their role for collaboration process, for example, university played a role as institutional R&D innovators where it provided research on the new technology while industry and government played as non-R&D innovators where they provided resources associated with the project. In addition, there were boundaries exists between each component defined by a cluster and scope of technology. In addition, the boundaries among the components affected by administrative units.

Stage 2 revealed the important factors which contribute towards the dynamic interaction between two parties. At the second stage, UIG getting close together and start to interact which includes collaboration, conflict moderation and collaborative leadership. Three factors emerged from the data analysis which ‘expectation of mutual benefit’, ‘trust-based relationship’ and ‘professional culture’. Furthermore, the relationships among system components include new knowledge combinations generated by the innovation actors, either through own efforts or by using technology transfer from other actors, provided they have sufficient absorptive capacity. The relationship involved the ‘multi-sphere’ hybrid institution due to its distinction arises from increasing knowledge-intensive activities, communication and interconnectivity between components.

Stage 3 described the formation and functioning of the TH started when spheres get closer together in a gradual process and start to overlap. This process creates synergy in collaboration which is the third concept of the research. There are three factors emerged from the data analysis which 'clear goal', 'commitment' and 'facilitating collaborations'. In addition, the researcher discovered that there was a transition from the consensus space to the knowledge space, and then to the innovation space, cutting across all the subsequent stage can be seen in this research. The construction of this space is an essential step in the transition to a knowledge society and has the ultimate purpose to create a 'critical mass' of knowledge resources to strengthen the local, regional and national knowledge base. Furthermore, the process avoided fragmentation and reduce duplication of research efforts. The innovation space took place which described the activities undertaken particularly by the 'multi-sphere' (hybrid) organizations and entrepreneurial individual and institutions discussed who was having as ultimate purpose the creation and development of intellectual and entrepreneurial potential, attraction of talent and innovative firms from elsewhere, and building a competitive advantage for the region and the country.

This research has presented the significant roles played by CREST in assisting UIG collaboration such as 'sponsor and fund provider', 'mediator and arbitrator', 'technology broker', 'filter and legitimator' and 'resource management provider'. The roles played by CREST according to the factor and activities which associated with during each stage. Initially, CREST played a significant role as technology broker, filter and legitimator and mediator and arbiter when there was less commitment and project deliverable involved at this stage. However, during stage two, UIG agreed on collaborative research and started the engagement process with the external parties. The roles of technology broker, filter and legitimator become less significant as the new roles of fund provider and resource management emerged at this stage. These two factors become highly significant due to the obligation towards the projects.

7. Conclusion

This research took a different perspective where it expanded the existing TH theory into more contemporary issues. There are three theoretical contributions emerged from the research. Firstly, this research provided a real case scenario where it provides an in-depth description of the factors influencing the UIG's decision-making process. Moreover, the findings provide an additional value about the TH model especially in Malaysia context. Secondly, this research revealed there were three unique different stages, namely, partnership evaluation, building relationship and synergy in collaboration. These stages provide a meaningful description of the activities happened during each stage. Thirdly, this research revealed there was a relationship exists between the TH and innovation where it defined the flow of technology and information among UIG as a key towards innovation process. This process described the interaction/communication among UIG helped to turn the idea into reality. This context of innovation system was described through the concept of THS which defined the set of component, relationship and functions in achieving those outcomes.

In addition, there are two practical contributions of research. Firstly, the research shown intermediary played significant roles in assisting the collaboration process. Therefore, the intermediary organization becomes relevant in the TH model where there was not enough support system and policy to bring UIG as compared to the ideal TH. The research revealed that intermediary organization should play

a neutral role in bridging the gaps among UIG collaboration that helped to stimulate the interaction activities. Secondly, the research uncovered there was a policy issue which is much reflected in the copyright and IP on the research output. Although, the UIG has agreed for CREST to be a caretaker and owned the IP, however, there has been some argument about the intricacies of the IP ownership. However, there are several limitations in this study such as limited numbers of respondents involved in UIG, and this research is only applicable to the scope of study which is related to CREST. In addition, the research is using a qualitative which related to the context of study which is CREST collaboration. The finding from this research might vary from the other context of research. Furthermore, the concept used in the research is limited to strategic partnership, TH, THS and intermediary organizations.

8. Recommendation

This research recognised the commitment and concentrated efforts made by UIG throughout the collaborative research. The researcher believes that university should be more proactive in leading the collaboration and exploring new technologies that able to meet the market demand. Although there has been some argument between UI on the commitment issues, university should prioritize their task to make to collaboration works.

UIG should work closely with industry and identify the suitable technology and knowledge to equip the graduates with industry relevant expertise. In addition, UI should be more cautious and discipline on the project deliverables timeline as the failure to do so has a great impact on the overall project performance. the researcher recommends industry should play the bigger role in facilitating the collaboration with university. In addition, industry should be more transparent in assisting the project progress e.g. in defining the boundary or limitation of information that should be shared by other partners. Besides that, the researcher recommends the government to further support the collaborative engagement between UI because it has a positive impact towards the development of E&E sectors in Malaysia. In addition, the government should come up with a more realistic measure for UI collaboration success. The researcher recommends CREST should remain as a neutral party in assisting the collaboration among UIG. In addition, CREST should be it a self-sustain organization that should continue to assist the collaboration UIG in the near future. However, CREST needs to make sure that it is worth to be funded again by the government.

In sum, the effective UI collaboration became a significant impact towards the project success. Thus, UIG helped each other during the process. The paper portrays a dynamic relationship amongst the UIGs throughout the stages and especially during the transition prior to moving towards a new stage, where the intermediary organisation plays a lead role as a catalyst. the context of TH collaboration, the catalyst is considered as an external agent which helps to improve the collaborative efforts among UIG without having any interest in the process. This research explains the importance of intermediary organization in stimulating the UIG collaboration, especially in the context of Malaysia. This provides a good foundation for understanding the process of strategic partnership, especially in the developing countries.

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