

COLLABORATION MANAGEMENT FOR UNIVERSITY- INDUSTRY PROJECTS IN SME'S FOOD PROCESSING INDUSTRY

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Universiti Sains Malaysia

Declaration

I am here by declare that the project thesis entitled “COLLABORATION MANAGEMENT FOR UNIVERSITY-INDUSTRY PROJECTS IN SME’S FOOD PROCESSING INDUSTRY” submitted to School of Mechanical Engineering, Universiti Sains Malaysia; TAN JIN TEIK in partial fulfillment of the requirement of Bachelor of Degree in MANUFACTURING ENGINEERING WITH MANAGEMENT is a project carried out by me under the guidance of Datin Dr. NORIZAH MOHAMAD. I further declare that the work reported in this project has not been submitted and will not be submitted, either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university.

(Tan Jin Teik)

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LIST OF ABBREVIATIONS

IHL	Institute of Higher Learn
MOE	Ministry of Education Malaysia
PPRN	Public-Private Research Network
GDP	Gross Domestic Product
PhD	Doctor of Philosophy
UIC	University-Industry Collaboration
SMEs	Small Medium Enterprises
IPT	Institut Pengajian Tinggi Belajar (Bahasa Malaysia)
PKS	Perusahaan Kecil dan Sederhana (Bahasa Malaysia)

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Abstrak

Kerjasama antara industry dengan university menjadi semakin popular seluruh dunia. Ia telah diiktiraf bahawa kerjasama antara industri dan universiti membolehkan inovasi dan pembangunan ekonomi negara. Projek-projek usaha sama telah menjadi faktor penting bagi Perusahaan Kecil dan Sederhana (PKS) untuk membangunkan perniagaan mereka. PKS tidak mempunyai pengetahuan teknikal manakala universiti yang mempunyai ilmu ini tidak mempunyai maklumat mengenai masalah syarikat. Menyedari kepentingan merapatkan jurang pengetahuan teknologi, mengoptimum dan memanfaatkan kepakaran yang sedia ada di Institut Pengajian Tinggi Belajar (IPT), Kementerian Pelajaran Malaysia (KPM) telah memulakan projek Rangkaian Penyelidikan Awam-Pirate (PPRN). Objektif utama PPRN adalah untuk meningkatkan produktiviti dan mengukuhkan pembangunan ekonomi Malaysia melalui program-program inovasi dan pengkomersilan dan mewujudkan ekosistem pengetahuan-friendly. Projek PPRN dimulakan atas keperluan industry. Industri akan menyatakan masalah mereka and IPT akan menyediakan penyelesaian untuk menyelesaikan masalah. Walau bagaimanapun, terdapat isu-isu dan halangan yang menghalang projek untuk mencapai kejayaan. Kertas ini mengkaji senario semasa projek kerjasama antara universiti dan industri melalui PPRN, memaklumkan halangan dan isu-isu dan menjana model yang memaklumkan isu-isu penting dalam projek-projek kerjasama. Metodologi kajian ini ialah kajian kes. Temubual bersemuka dijalankan dengan pengurus 3 PKS yang terlibat dalam projek PPRN. Semua PKS yang terletak di kawasan Pulau Pinang disebabkan oleh kekangan masa dan isu pengangkutan. Kertas kerja ini mendapati bahawa isu-isu dan halangan untuk projek kerjasama antara industri dan universiti dari perspektif Enterprises Kecil dan Sederhana (PKS) adalah perkongsian, pengurusan projek, faedah, isu-isu politik dan isu teknologi yang menepati kajian literatur. Antara isu yang dibincangkan, manfaat adalah isu yang paling penting dari perspektif industri. Sejak PKS adalah elemen penting dalam pertumbuhan ekonomi Malaysia, halangan dan isu-isu daripada projek kerjasama perlu diatasi dan membawa kepada projek kerjasama berjaya. Model menyediakan tanda untuk menjayakan lebih banyak projek PPRN pada masa akan depan.

Abstract

There is a growing world-wide trend toward greater collaboration between industry and university. It has been recognized that the collaboration between industry and university can initiate innovation and a driver for economic development. The collaborative projects have become important path for Small Medium Enterprises (SMEs) to develop their business. The SMEs lack the technical know-how whilst the university that has these knowledges lacks the information on the company's problems. Realizing the importance of bridging these technological knowledge gaps, optimizing and leveraging the expertise available at Institute of Higher Learn (IHL), the Ministry of Education Malaysia (MOE) has initiated the Public-Private Research Network (PPRN) projects. PPRN projects are demanding driven projects which are described by companies and experts from IHL provides state of the art technology to solve the problems. However, there are issues and barriers that inhibit the project to its success. The paper study the current scenario of collaborative projects between universities and industry through PPRN, determine the barriers and issues and develop simple model that represent the important issues in collaborative projects. Case study is used as the methodology in this research. Face-to-face interviews are conducted with the manager of 3 SMEs that involved in PPRN project. All of the SMEs are located in Penang area due to time constraint and transport inconvenience. This paper found that the issues and barriers for collaborative project between industry and university from the perspective of Small Medium Enterprises (SMEs) are partnership, project management, benefit, political issues and technology issue which are conform to the literature review. Among the issues discussed, benefit is the most important issue from the perspective of industry. Since the SMEs is the important element of economy growth of Malaysia, the barriers and issues of the collaborative projects must be overcome and leads to successful collaborative projects. The simple model provides hints to succeed more collaborative projects in future.

Chapter 1: Introduction

1.1 SMEs Food and Beverage Industry

In Malaysia, the SMEs contributes to the economy growth of the country by offering job opportunities to the residents. SMEs in Malaysia is under management of SME Corporation Malaysia (SME Corp. Malaysia). SME Corp. Malaysia is a Central Coordinating Agency under the Ministry of International Trade and Industry Malaysia that formulates overall policies and strategies for SMEs and coordinates the implementation of SME development programs across all relevant Ministries and Agencies. Basically there are 2 categories of SME in Malaysia, manufacturing sector and services and other sectors. The sales turnover of manufacturing sector does not exceed RM50 million or full-time employees not exceeding 200 workers. To define services and other sectors, the sales turnover should not exceeding RM20 million or full-time employees not more than 75 workers. (SME Corporation Malaysia - SME Definition, 2017)

Food and beverage (F&B) industry in Malaysia is rapid growing industry by large export market. The most significant exports are in oil and fats category, particularly palm oil-based products due to the strategic location for palm oil tree planting. The F&B industry accounted for approximately 9.8% of Malaysia exports in 2015. (EMIS, 2016 July)

1.2 Collaborative project between University and Industry

The collaboration in today's world is definitely important factor to drive a country's economy. The challenges of Malaysian economy is that the GDP of manufacturing sector is decreasing from 31% at year 2000 to 25% at year 2012. The investment and productivity is also decreased by 50% compared to 1990s. The main reason of this negative trend is that SMEs has technological knowledge gap compared to foreign manufacturing industry. This cause negative impacts to the society and economy of Malaysia, the SMEs unable to offer a competitive product to the market and their production is not efficient in terms of methods and technology. SMEs decides the growth rate of a country, hence it is no way to ignore

the development of SMEs. In order to cope with the situation, an initiative is taken by the Ministry of Education Malaysia to enhance the collaborative projects. PPRN is established to assist the SMEs to collaborate with the university or independent researcher in order to increase their performances. A knowledge-friendly ecosystem is created where knowledge is produced and diffused from those have it to those that need it, university to industry. PPRN projects focus on demand driven research. It is done by facilitating meeting with industries by design and idea presentation. PPRN will optimize and leverage resources and expertise available at IHLs. There is total 95,000 experts available in IHL which composed of 71,000 lectures and 24,000 PhD students. Besides, company and PPRN will co-finance the development cost depends on the size of company.

1.3 Project Background

In this competitive environment, SMEs must achieve a high level of performance, leading to the production of innovative products or process, fast response to market demands and customer needs. In this case, industry do not have all the required skills or expert to develop such product in house. (Larisa Ivascu, 2016) As mentioned in The Toyota Way Principle 11: respect your extended network of partners and supplier by challenging them and helping them improve, collaboration allowed higher degree of innovation and economic growth by learning together. (Liker, 2004)

University has been recognized as the center of knowledge of a country. Malaysia is heading toward a new era of knowledge based economy. Knowledge has become the main driver of Malaysia's economy. Numerous researcher have concluded that a successful country, the industry should know how to acquire, utilize and leverage knowledge effectively. (Sohail, 2009)

Innovation is an important process for a success business in terms of product, process and management of business and university is the center of innovation. There is a growing trend toward the collaboration between university and industry, especially in SMEs industry. This collaboration leads to a win-win situation to university, industry and the

country. SMEs able to improve their productivity and quality while reducing investment cost in research projects. On the other hand, university able to raise fund for their research projects and their students have the opportunity to involve in industrial projects to gain experience and add value to the student's quality. The benefits of university-industry collaboration are also evident in developing the countries. For example, a study in Chile and Colombia shows that collaboration with universities substantially increased the propensity of firms to introduce new product patent (Daniela Marotta, 2007). In School of Mechanical Engineering USM, there are total 36 success collaborative project and 1 failed project from December 2015 until June 2016.

Public-Private Research Network (PPRN) was launched on 24th of February 2015 by the Prime Minister of Malaysia as a new initiative to promote strategic cooperation between universities, industry and government agencies. The objective of PPRN is to create a network that encourages knowledge sharing in Malaysia. The knowledge and information is collected and diffused from university to SMEs in order to grow Malaysia economy.

There are many SMEs food processing industry around Seberang Perai Selatan area. 3 of the SMEs had been chosen to conduct the interview to investigate the barriers and issues of the collaborative projects. Expectation of SMEs is different from large enterprises. New researcher often heading to the wrong direction of their project. The outcome will provide an indicator to the researcher for future university-industry collaborations. The simple model developed in this project will assist the new researcher to focus on the right direction when conducting research or improvement project.

1.4 Problem Statement

With the increasing competition between SMEs in Malaysia, it is critical to develop new methodologies to face the challenges in the market. The technology of R&D department in SMEs is very limited as they do not have high budget to invest for the technology. In this case, PPRN project which is project linked industry, university and government together can assist SMEs to solve this issue and improve their productivity and quality.

PPRN project is not always successful due to various reasons. SMEs desire to participate in this project to develop their business. However, there are some doubts towards the collaboration (a) What is the important issues of collaborative projects between university and industry? (b) What are the barriers of collaborative project between university and industry?

Collaborative project between university and industry are win-win situation for both parties and the country. The purpose of this study is to study the management of collaborative projects and identify the barriers and issues of collaborative projects between university and SMEs in Seberang Perai area. In this study, only perspective from the SMEs will be included. The perspective of the researcher is excluded from the study as the researcher is different from the case study.

1.5 Objectives of Research

To understand more about the collaboration between universities and industry in SMEs' food and beverage processing industry, it is crucial to determine the current situation of SMEs' food and beverage industry. PPRN is an initiative by Ministry of Education (MOE) as one of the strategies to increase productivity and strengthen Malaysia economic development through innovation and commercialization programs. However, there are some issues or problems that leads to the failure of the collaborative projects. In this research, we need to know the key issues and barriers face during the collaboration. From there, we can identify the key that leads to a success collaborative project between university and industry.

The objectives of research are as below:

1. To study the current scenario of collaboration between universities and industry through PPRN.
2. To determine the barriers of collaborations between universities and industry.
3. To determine the issue related to the collaboration between universities and industry.

4. To develop simple model that represent the important issue in collaborative projects.

1.6 Scope of project

In this project, the collaboration management between university and industry is only discussed from the perspective of industry instead of university, government and industry. The project discussed about the barriers and issues face during the collaboration. A simple model will be developed to alert researcher about the expectation of the SMEs. Due to time constraint and transportation inconvenience, the study was conducted with 3 companies in Penang area only.

1.7 Thesis Organization

The first part of this chapter is the background of the research includes SMEs Food and Beverage industry, collaboration between university and industry and project background. The second part of this chapter provides problem statement, research objective and scope of the project. Chapter 2 contained summary of PPRN's project flow, scope, finance issue and analyze of literature review of previous study. Chapter 3 explains the available methodology available and the reason case study is chosen as the methodology. Chapter 4 discusses the results of the interview, issues and barriers of collaboration project and provide a simple model to enhance the success rate of collaboration project in future. Interview questions and amount of collaborative projects done in School of Mechanical Engineering are contained within the Appendices.

Chapter 2: Literature Review

2.1 Introduction

The collaboration between university, industry and government is much dependent on the relationship between the parties. The triple helix model developed by Henry Etzkowitz (2002) has been receiving attention from the management experts. Figure 1 shows the model that depicts the state incorporates industry and university. The spiral model of innovation recognizes the change from Industry Society to Knowledge Society through the shifting focus of industry-government cooperation to the three sided relationship between university, industry and government in scientific in scientific research. Figure 2 shows the model that indicating the institute overlap and collaborate and cooperate with each other. In this model,

- a. Universities are beyond their conventional roles of educating and research, as they become actively participates in shaping their socio-economic environment through the exploitation of their intellectual property, network and human capital.
- b. Industries are continuously improving their technological level, which indicates a higher degree of training and knowledge share at the same time.
- c. Governments accept the role of “public entrepreneur and venture capitalist” beside their administrative act.

One of the key concepts of the model is students are strongly encouraged to generate new ideas, develop both hard and soft skills and venture to the field of entrepreneurial activities themselves. (Etzkowitz, 2002)

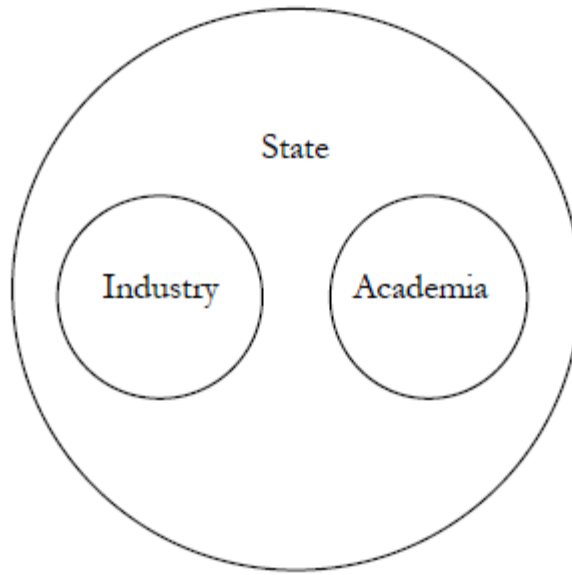


Figure 2.1: Model that states incorporate industry and university

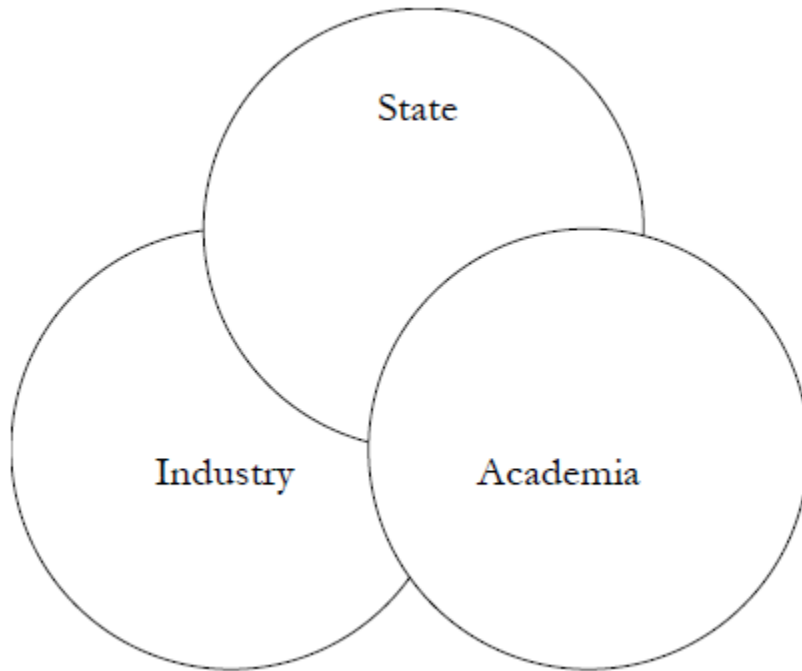


Figure 2.2: Model of 3 institutional spheres overlap

2.2 Public-Private Research Network (PPRN)

2.2.1 Project Flow

PPRN project is an initiative by the Ministry of Higher Education Malaysia as the strategy to narrow the technological knowledge gap, increase productivity and strengthen Malaysian economic development through innovation and commercialization programs.

Company or industry that face problem in the production can register project by submitting the application form to PPRN. If the applicants fulfilled the scope of project, he or she will be invited to Matching Session (Sesi Pemadanan) with the researchers where industry will present about the problem face while researcher will present about the proposed solution. PPRN will find a team of experts or scientists that will provide state of the art technology to solve problem. Company and PPRN will co-finance development cost. (PPRN, 2017)

Before starting the PPRN projects, 2 pilot projects had been conducted and there are some conclusion made. Malaysia companies try hard to improve their technology but always fail due to numerous reasons. Through this project, SMEs can benefit from external help and the knowledge is sitting in universities and research institutes. This research institutes can provide cheap and efficient solution to solve company's technological problems.

2.2.2 Project Scope

PPRN projects is to assist the SMEs to improve their business. The scope of projects divide into 3 categories, product innovation, process innovation and value enhancement in supply chain.

For product development and innovation, the scope is to improve or value add the existing products of the company to the needs of the market. Besides, new product, services or software will be developed to add value to the company.

For process innovation, the scope is to implement of new or significantly improved production process, sourcing components, warehouse, logistics, delivery method of service. The project is also aim to scale up the production and to streamline production to make it more efficient and better use of state-of-art technology.

For value enhancement in supply chain, the main target is to improve the warehouse and logistic system and sourcing components. Besides, it also help to develop Information Systems solutions.

This project will focus to the process innovation as all of the three studied company prefer to have an innovation improvement on the production line rather than the product itself. (Scope of Projects, 2017) (PPRN, 2017)

2.2.3 Application Criteria

- Application is open for all companies registered in Malaysia with annual sales turnover of more than RM50, 000.
- Projects need to be technological in nature.
- Projects that essentially involve management or marketing solutions will not be considered.
- Projects that essentially require the purchase of off-the-shelve solutions will not be considered.
- Product or services must be at commercial stage. For example, ready in market but may need improvement in term of process or product itself.
- No field restriction for projects.
- For multinational companies, they must have a majority of Malaysians as shareholders (>51%).

(PPRN, 2017)

2.2.4 Funding mechanism

As mentioned earlier, the PPRN and company will co-finance in the cost of project.

The ratio of budget commitment between PPRN and industry is shown as below:

Table 2.1: Ratio of budget commitment between PPRN and industry

PPRN : Micro sized enterprise	90% : 10%
PPRN : Small sized enterprise	70% : 30%
PPRN : Medium sized enterprise	50% : 50%
PPRN : Large sized enterprise	30% : 70%

PPRN's expert will visit the enterprise before approving the project. When the project is approved, the budget commitment will inform the industry. The total amount supported by PPRN can up to RM50, 000 each project. 70% of PPRN funding will be used for research material, prototyping or testing of new product. 25% will be rewarded to the researcher and the rest will be to the institutions. The size of company is based on new definition of SME by SME Corp Malaysia which in effect from 1 January 2014.

(PPRN, 2017)

2.2.5 Selection criteria and requirements

PPRN does not approve all project in application. The project need to be technological in nature. Those projects that essentially involve management or marketing solutions will not be considered. Product involved must be at commercial stage that ready to market but need improvement in terms of process or product itself. There is no field restriction. Projects may involve any area of applied science or engineering. For project that able to be completed within six months will be given priority, however, the secretariat may accept project duration up to one year if the project have significant social and business value.

2.3 Issues of collaborative project

In this competitive market, university-industry collaboration in innovative industry significantly affect development of the country. There are many issues that related to the collaboration between industry and university. Table 2.2 shows the summary of the literature review of previous study.

Factors that affect the collaboration between industry and university:-

2.3.1 Partnership

The commitment and contribution of partners decides the success of the project as the industry provides technical support, specifications, and expert knowledge. On the other side, the university will do the majority work of research. Partner should be evaluated from many aspects such as quality of staff, shared vision or strategic, complementary expertise, mutual understanding, no hidden agendas and collaborative experiences. (Barnes, 2002) (Rita Teller, 2015) Mutual trust plays an important role in building strong relationship between industry and university. Good relationship enhance the success rate of long-term collaboration. Mutual trust can prevent conflict during the project and solve problem occur. (Bruneel, 2010) A high-level of conflict tend to fail the project but it is not easy to maintain a good relationship. (Angelina Seow Voon Yee, 2015) Some studies shows that trust brings positive impact to the establishment and management of R&D collaboration and also future collaboration opportunity. (Philbin, 2008) (Nokkala, 2008)

2.3.2 Project management issues

When carry out a project, the objectives and goals are very important. A clear defined objectives and realistic aims can enhance the progress. Besides, the project planning, progress monitoring, better task allocation, better scheduling

and better interpersonal communication also vital to ensure the project can be completed successfully. (Chin, 2011) According to (Mora-Valentin, 2002), state that research organizations treat this factor as an important in collaboration, while industries treat is in the opposite way. Lead researcher and top management commitment and support is another factors that success the project. A project cannot be done alone but need the corporation from every authority. This required effective communication from everyone so that the project can be completed without difficulties. (Barnes, 2002) (Rita Teller, 2015)

2.3.3 Environmental issues

One of the environmental influences is the corporate stability. One case study shows that one of the industrial partners revealed that at the time of joining one of the projects, this company had undergone a change of ownership and a complete change of senior management team. The project not received the attention as it should have. This may lead to the failure of the projects. Corporate instability is an issue that is happened more commonly with SMEs. (Barnes, 2002)

2.3.4 Benefits

The benefits or reward within an organization able to motivate individual to achieve shared goals and contribute to the success of a collaboration. (Angelina Seow Voon Yee, 2015) The key concern of partners in a research collaboration will be the outcomes itself. From the projects studies in the journal, if the partner perceived little benefit from their involvement in the project, In particular, one of the partner withdrawn from the project. (Barnes, 2002)

The collaboration between university and industry brings benefits such as financial, profit, royalty, recognition, acknowledgement and promotion of

researchers to both parties. The collaborative projects will enhance the reputation and prestige of industry to the students and staffs in university. University also build reputation in the industry. This will also enhance the students' employability who participated in the related research. (Angelina Seow Voon Yee, 2015) (Samuel Ankrah, 2015)

2.3.5 Cultural issues

The cultural issue to arise from the journal's case study was related to the role of doctorate students within the projects. Some case study projects involved students to do the research work while some did not due to consideration for the requirements of doctorate-level work and the ability of students to add value to the project. Time horizons of academia and industry is the fundamental differences in cultural issue. For example, the fiscal year of company starts from March and university starts at September. The difference in time horizon will cause procrastination in the related project. (Barnes, 2002) (Eveleens, April 2010) (Rita Andrade, 2016) According to (Bodas Freitas, 2008), (Bruneel, 2010) and (Dunowski, 2010), normally university research conducted at longer period time, while industrial research is completed in shorter periods because they need the result in order to compete in the market and achieve advantage. Besides, the common vision which supposed to be mutual work of both parties unfortunately was emphasized solely on the universities side, most of the companies having the poor attitude towards cooperation with universities. (Rita Teller, 2015)

2.3.6 Leadership

A good and efficient leader or manager will recognized the importance of empowering and inspiring co-worker, while leading change and employing a shared goal or vision throughout the whole project or assignment. (Rita Teller,

2015) Regardless large number of opinions, scholars agrees on the importance of certain characteristics and personality of a manager that lead to effective performance. (Zaccaro, Jan 2007) Leader are facing diverse challenges within an organization, which require different role to be performed in different situation.

2.3.7 Political issue

For the success of a project connecting university and industry, the policy and legislation of government plays an important role. Support like tax credits, information networks and direct advisory assistance to the industry can ease the collaboration projects. The policy of university including intellectual property rights (IPR), patents and licenses also another factor that affect the success project collaboration. (Samuel Ankrah, 2015)

2.3.8 University policy

The university itself does not give the opportunity to create a successful project with the industry. The lecturers have too much work load such as teaching, preparing test questions and other administration task, hence they have no chance even to start any innovative collaboration. (Rita Teller, 2015) (Hamisah, 2010). The innovative collaboration with industry need to be participated by the students as well, as to prepare future leader to face the real practical world by gaining experience and value to themselves. Besides, young students have better innovation idea as they are exposed in a high technology generation.

2.3.9 Technology issues

This is the knowledge that stimulate improvement in process and product. Nature of the technology or knowledge to be transferred is another important issue for the success of project. (Eveleens, April 2010) (Rita Andrade, 2016) Technology exchange or transferred is to make sure commercialize of technology can be done successfully. (Samuel Ankrah, 2015)

2.4 Research model

Figure 2.3: Research model

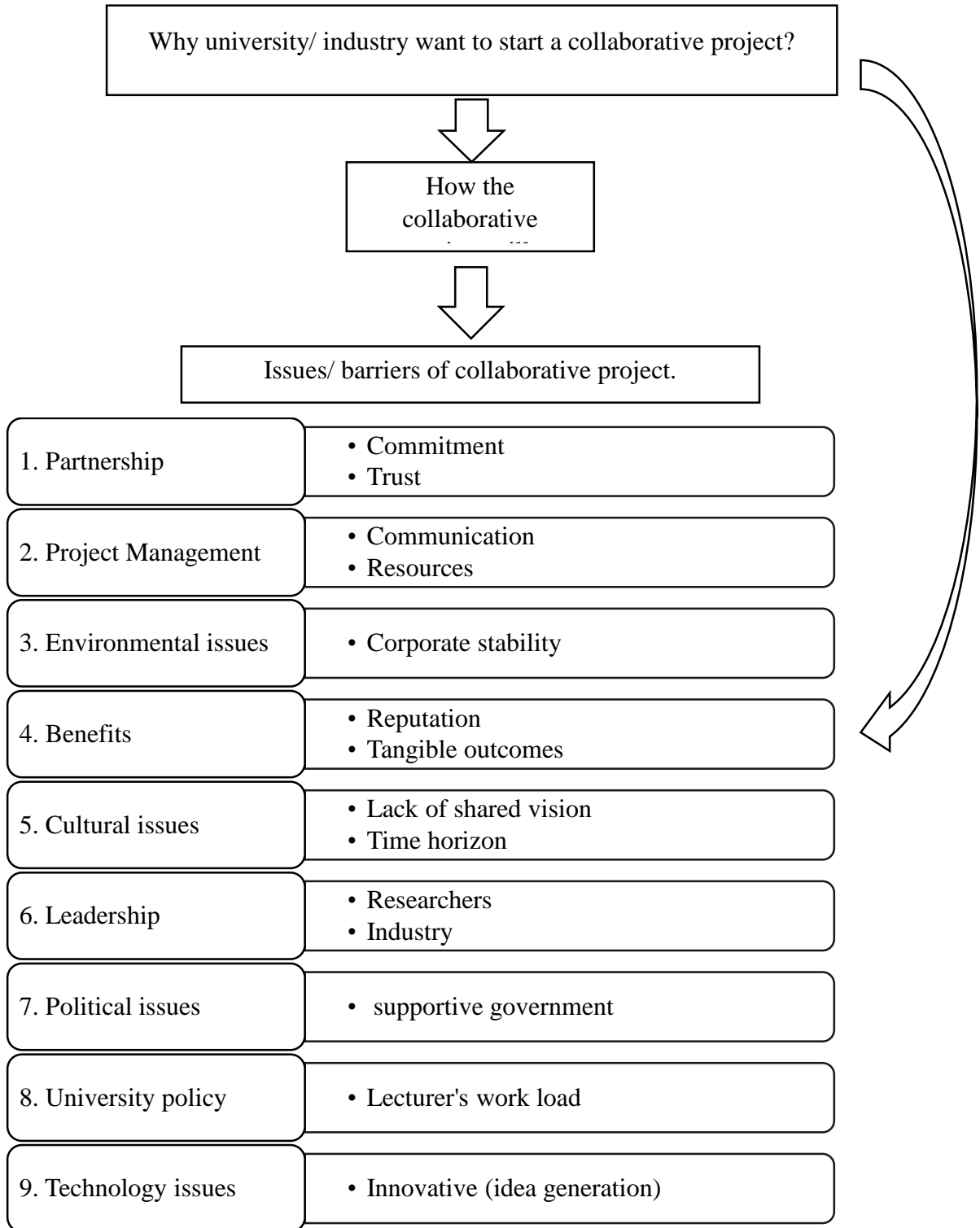


Table 2.2: Factor of University-Industry Collaborative Project of previous study

Author	T.Barnes, I.Pashby, A.Gibbons	Chris Eveleens	R.Teller, A.F.Vaildova	S.Ankrah, O.A.Tabbaa	L.Ivascu, B.Cirjaliu, A.Draghici	Summary
Country	UK		Russia & Hungary	UK	Romania	
	Choice of partner				New partnership	Partnership
	Project Management issues	- Resources - strategy -Organizational structure	- Uni structure not allow	- capacity & resources - management & organization issues	Project management	Project Management
	Universal success factor -Trust -Commitment					
	Monitoring environmental influences				Identify characteristics of economic environment	Environmental issue -Political issue
	Outcomes			Social issue		Benefits
	Cultural issues	Culture	lack of shared vision	outcomes	Organizational culture	Cultural issue
		Leadership	Leadership	Leadership		Leadership
				Political issues		Political issues
			Uni structure not allow	Legal issue & contractual mechanism	University structure	University policy
		skills		Technology issues		Technology issues

Chapter 3: Research Methodology

In qualitative method, data are collected through participant observation and interviews. The data are analysed by themes from descriptions of interviewees. Qualitative research is useful for studies at individual level and explore the ways in which people think or feel. (McLeod, 2008) The case study approach is particularly appropriate for exploring the issues and barriers in collaboration between university and industry because it can provide more prominent details that is often missing from just answering the questionnaire. Structured interview is often conducted to truly understand the target companies. Analysis of qualitative data is more difficult and complex compared to quantitative method. This is because accurate description is required to allow the research to interpret the information correctly and accurately. Normally, the interviewee is the owner of the company or person in charge of the project as they need to precisely answer all questions about collaboration of the project.

This research brings together the results of thorough review of the published literature in the field of collaboration management and empirical evidence. Qualitative research was conducted in this project. This is because only 3 companies allow us to conduct interview with them. A cross-case analysis was subsequently conducted in order to identify any common issues to emerge from the cases, as well as to facilitate comparison between the cases and the literature. Of the three food processing industry, only one of the company had collaborated with the university successfully, the other two companies had some issues and the project not yet completed.

The collection of data for this research was carried out primarily through **face-to-face interview** with manager or owner of the companies. Small Medium Enterprises (SMEs) were targeted as the study of this research project. According to SME Corporation Malaysia, for the manufacturing sector, SMEs are defined as firms with sales turnover not exceeding RM50 million or number of fulltime employees not exceeding 200.

The owners were requested to answer several questions related to PPRN projects which covered different aspects such as partnership, project management, environmental issues,

benefits, cultural issues, leadership, political issues, university policy and technology issues. Besides answering related questions, respondents also requested to rank the significance of each factor.

However, the case study approach is just from the perspective of the industry, it does not indicate the whole collaboration system. Despite of the system, the data collected are true and valid.

The results will be compared with the outcomes of literature review conducted before. A research model will be generated as the reference for future improvement in collaboration of university-industry project. Figure 3.1 shows the summary of the methodology.

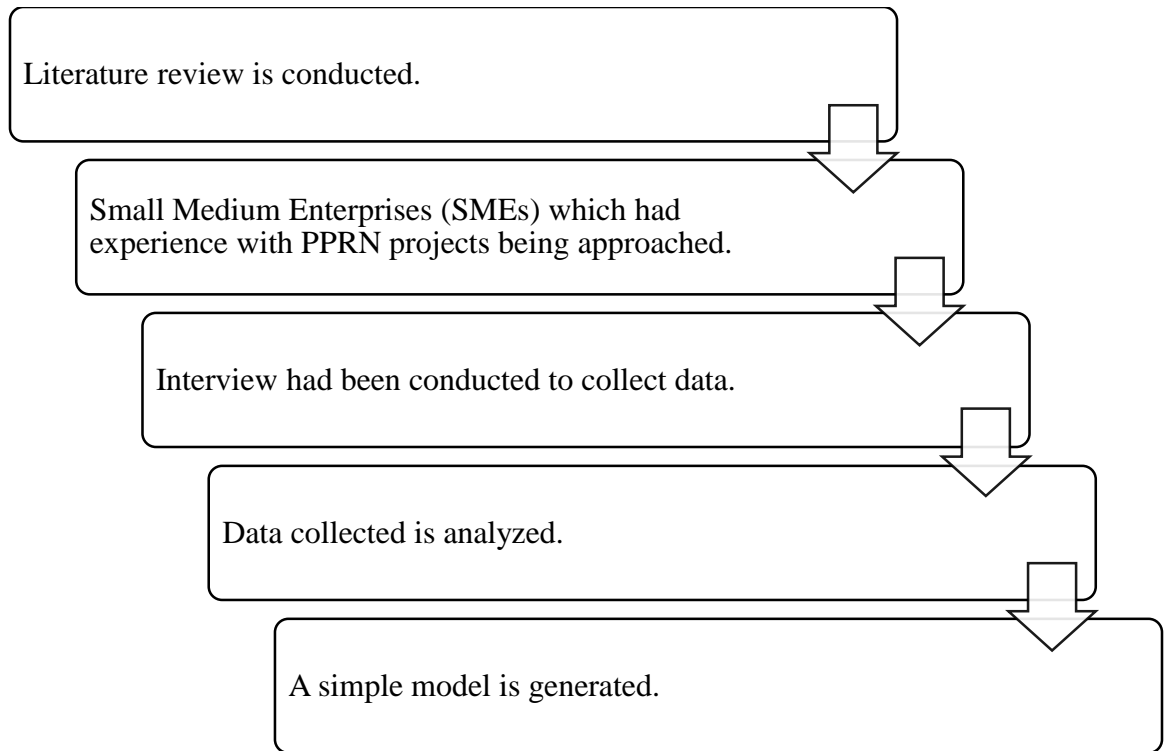


Figure 3.1: Methodology of research

Chapter 4: Results and Discussion

4.1 Introduction

This chapter discuss about the profile of company, interview outcome and ranking of the issues and barriers related to the collaborative project. A simple model is also generated as starting point of the study of collaboration between university and industry.

4.2 Profile of Company

4.2.1 Case Study 1: Teratak Chocolate

Company :	Teratak Coklat
Address :	Seberang Jaya, Pulau Pinang.
Respondent :	Mrs.Aishah by Baharom
Position :	Manager
Service area :	Malaysia
Types of products :	<ul style="list-style-type: none">✓ Bread✓ Cookies✓ Cake✓ Chocolates
Number of employees :	8
Future target :	Build one-stop café for customer.
Desired collaboration partner:	Universiti Teknologi MARA (UiTM)
Collaboration partner assigned:	Universiti Teknologi Malaysia (UTM)
PPRN project status:	Failed

4.2.2 Case Study 2: Fajar Menyinsing

Company :	Perniagaan Fajar Menyinsing
Location :	Nibong Tebal, Pulau Pinang.
Year founded :	1946
Respondent :	Mrs. Murni bt Hassim
Position :	Manager
Service area :	Malaysia
Types of products :	<ul style="list-style-type: none"> ✓ 2 in 1 Coffee ✓ Teh Tarik ✓ White Coffee ✓ Coffee Durian ✓ Chocolate
Number of employees :	7
Customer:	Contractor, Retailers, Agent, Distributor, Direct customer
Collaboration partner:	Politeknik Sultan Salahuddin Abdul Aziz Shah, Shah Alam
PPRN project status:	In progress

4.2.3 Case Study 3: ADAM Chocolate Drink

Company :	ADAM Chocolate Drink
Address :	Sungai Acheh, Nibong Tebal, Pulau Pinang.
Respondent :	Mr. Mohamad Zamri Idris

Position :	Manager
Service area :	Malaysia
Types of products :	<ul style="list-style-type: none"> ✓ Pure and dark chocolate ✓ Vanila creamy ✓ White and black coffee ✓ Cappuccino ✓ Mocha ✓ Tea
Number of employees :	4
Future target :	Expand market to Singapore
Collaboration partner:	None
PPRN project status:	In progress

4.3 Interview outcome

4.3.1 Case Study 1: Teratak Chocolate

According to Mrs.Aishah by Baharom, she participated in the Matching Session held by PPRN. The purpose of starting the project is she wish to increase the productivity of the production line. She done her presentation and the university had presented proposed solution to her. After thorough consideration, she decided to choose Universiti Teknologi MARA's (UiTM) idea which is easy and simple and not high in cost. UiTM's students had visited her for few times to work on the project before the PPRN Matching Session. The experts from PPRN visited her shop lot and evaluated her business. After that, she is requested to wait for approval. After 2 months, the project had been approved but the collaboration partner is University of Technology Malaysia (UTM) instead of UiTM. Besides, the ratio of budget commitment is 70%:30 % for PPRN and her company respectively. Hence, she felt disappointed and decided to reject the project. Her son who is

an engineering student in Universiti Teknikal Malaysia Melaka (UTeM) improved the process on his own by applying the knowledge learned in the university. Mrs.Aishah said that easy and simple solution is the most important factor to success the collaboration project. High-technology solution with complex machine and controller is not feasible for any company. This will leads to high cost of investment and also high maintenance cost. Another critical factor that cause this project failed is because of the political issue. The PPRN does not approve what is chosen by the owner but approved another proposal which is not chose by Mrs.Aishah. Mrs.Aishah preferred face-to-face discussion instead of calling and e-mail. Mrs.Aishah is the founder of the company and sponsored by her husband, and the company did not undergo any changes in organization structure. Hence, the environment issue has no impact towards the collaboration project.

4.3.2 Case Study 2: Fajar Menyinsing

According to Mrs.Murni bt Hassim, manager of Fajar Menyinsing, the company is collaborating with Politeknik Sultan Salahuddin Abdul Aziz Shah, Shah Alam to improve the capacity of the company. The idea is to generate a machine which fill the the coffe into the tea bag automatically. There are total of five universities who done the presentation to compete for this project. The universities includes Universiti Sains Malaysia (USM), Universiti Teknologi MARA (UiTM), Universiti The collaboration project was approved at November 2016. However, the project not yet completed due to procrastination. The company still waiting the response from university to implement the improvement. Currently, the company is using an old improved machine to replace the broken filling machine. The capacity had improved from original 10 cartons to 40 cartons per week. The company is looking for further improvement in capacity that done by the university. In this case, the owner still waiting for the progress update from the research side for the improvement process.

Due to long distance between the plant location and Politeknik Sultan Salahuddin Abdul Aziz Shah which is located in Shah Alam, the communication method used is phone call or social media. All the discussion and decision are made through this channel. The