

ICH 2019

International Conference on Humanities

**QUANTIFYING COLLABORATION LEVEL OF SARAWAK'S
UNIVERSITY INDUSTRY POLICY ENTITIES ON
ENVIRONMENTAL MATTERS**

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Abstract

Realizing the importance of practising environmental concern, it is needed to understand the tools used to tackle the issues. Collaboration approach is an effort that unites different entities together in a shared objectives to improve and manage any environmental matters. Although the linkages among the university, industry and policy have started, it offers relatively little information on the level of collaboration specifically on environmental matters so far. Thus, this study seeks to examine the level of linkages among university, industry and policy entities on environmental matters in Sarawak. This study addressed the gap through a mixed method of qualitative and quantitative approaches in which the data was collected based on a face to face interview using structured questionnaires in Sarawak. Drawing from a number of 199 respondents from 199 different entities in Sarawak, the study explores the pattern of collaboration, the level of existing collaboration, and the level of importance of collaboration perceived by the respondents. Findings indicated that the current level of collaboration work among university - industry - policy entities in Sarawak, particularly on environmental matters is at an infant stage and still relatively poor. This assessment suggested that more effort to promote or increase the number of collaborations among these entities in order to tackle and manage environmental issues in the near future.

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Keywords: University-Industry-Policy linkages, linkage status, environmental matters, Sarawak.

1. Introduction

Collaboration work has emerged as a trend and started to be recognized by most countries, governments and organizations. Collaboration itself has been defined by many researchers. According to Lai (2001), collaboration is defined as a mutual engagement of commitments, having the same objectives or goals in order to solve a common issues. Amabile et al. (2001) mentioned that collaboration as organizations who differ in noticeable ways sharing knowledge of information while working towards the same purpose. On the other hand, Jassawalla and Sashittal (1998) defined collaboration in a similar manner, as the grouping of diverse interest and social gatherings to tackle a common objective of issues. In general, collaborations are identified by shared goals, symmetrical structures, interactivity, inter dependency and sharing information (Hogue, 1993; Perkins, 2002; Peterson, 1991).

Collaboration is suggested as the ways to tackle environmental issues, and the approach has been implemented in many countries including Malaysia. Collaboration approach is considered to be important as the approach of collaboration was viewed to be the tools for potential success especially in managing environmental matters (Gajda, 2004). It revolves around the idea that the environmental problems are not on the responsibility of only one central government to manage (Durant et al.,2004; John, 1994)

In collaboration work, the stages theories mark out the levels of collaboration with the lowest as minimum or absence of collaboration, and the highest level is at maximum collaboration (Frey et al., 2006). Those with no collaboration level should engage in collaboration works as to answer the call of our Malaysian Plan. In the 11th Malaysian Plan 2016-2020, that was reformed by Malaysia's Prime Minister, Tun Dr Mahathir Mohammad, under the Malaysian Plan sixth pillar which is pursuing green growth for sustainability and resilience, among its strategy is to strengthen awareness to create shared responsibility which includes the public, stakeholders, governments, university or non-governmental organizations (NGOs) to instill a sense of shared responsibility towards environmental matters through integrated efforts (Eleventh Malaysian Plan, 2018).

As collaboration are growing in recognition, various factors of why is collaboration important has been studied. One of the reasons are there are many potentials of collaboration which includes higher productivity. According to Beaver (2001), organizations that collaborate with each other tend to have higher productivity than those who does not collaborate with each other. This is supported by Rigby and Edler (2005) who mentioned that the organization that collaborate with each other has higher quality of result than the organization that does not care to collaborate with each other. This is logical as when practising collaboration there are more than one organization or entities that work together by putting in their mind and efforts into solving a certain issues. Other advantages of collaboration identified are access to skilled manpower. Through collaboration, manpower could be fully utilize by both organizations (Katz & Martin, 1997; Melin, 2000). With all these advantages of collaboration, many organizations seek to encourage collaboration by means of establishing research centers, or contributing funding for collaborative engagement to improve many raising issues such as environmental issues (Sonnenwald, 2007).

Therefore, with all the potentials and factors of collaboration, it is important to investigate on the level of collaboration. In order to reap the benefit of collaboration, it is significant to investigate the practise in depth.

Sarawak, the location of the study is located in the island of Borneo. It is known for its diverse biodiversity and natural resources. However, heavy industries have been expanded rapidly in Sarawak as there are few industrial zones within Sarawak. These factories in Sarawak may contribute to great ecological, social and environmental impact within their surroundings. Therefore, to address environmental issues, collaboration among the universities, industries and governments was suggested as the tools to reduce environmental matters.

The government of Malaysia had implemented clear policies since the early 1990s to inspire collaboration among entities (Rasiah & Govindaraju, 2009). However, research on the collaborative activities among these industries with university and policy entities to manage environmental matters is still lacking and no clear overview exists. While there might be an existing collaboration activity, but there are still no clear information or reports related to the level of collaboration in Sarawak particularly on environmental matters.

2. Problem Statement

Malaysia as an upper middle - income country is rapidly developing in Asia. Its goal is to reach high income status by 2020 while making sure of the sustainability of the development growth. However, the aspiration to achieve developed nation has created challenges in terms of managing the environmental matters. Environmental issues are complex issues where solutions demand expertise from variety of disciplines, government interference, university and industry support. It is impossible for an individual to work independently, to find solutions for environmental issues (Hartman, Hoffman, & Stafford, 2002). Therefore, new modes of governance which emphasis on collaboration among the university, industry and policy makers were used to tackle environmental matters (Glasbergen, 1998). Collaboration, an approach to unite different entities in a shared objectives is deemed to be the best way to tackle environmental issues. In Malaysia, there are growing amount of evidences that depicts the engagement of one entity with another entity in addressing environmental matters (Bodin, 2017). The government of Malaysia itself has implemented several policies that are in favour to collaboration in addressing environmental matters. However, while there are government focus in collaborative work on environmental matters, it is still reported that there are lack of assessment in how strong is the strength of linkage collaboration structure between university - industry - policy entities on environmental matters in Sarawak. According to Rasiah and Govindaraju (2009), there are little collaboration relationship established in Malaysia and there is still no clear overview on the level of linkages of collaboration especially on environmental matters in Sarawak. Thus, this study is to explore on the level of linkages among university-industry-policy entities on managing the environmental matters in Sarawak, Malaysia as to provide a clear overview state of the collaboration level.

3. Research Questions

The three research questions in the study are:

- 3.1. What is the pattern of collaboration, particularly on environmental matters in Sarawak?

- 3.2. What is the level of linkages of collaboration, particularly on environmental matters in Sarawak?
- 3.3. What is the level of importance of collaboration in Sarawak?

4. Purpose of the Study

The objective of the study is to examine on the level of structural linkage among universities, industries and policy entities, particularly on managing environmental matters in Sarawak, Malaysia.

5. Research Methods

The study employed a mixed method to access the university - industry - policy linkages in Sarawak particularly on environmental matters. The data collection for the results was collected by a face to face interview from 199 entities in four main divisions of Sarawak that are in Kuching, Sibü, Bintulu and Miri.

5.1. Target respondents

The target respondents for this research are random officers that is familiar with the subject study. The respondents were chosen from different entities of universities, industries and policy makers. Only one respondent is chosen to represent one entity.

5.2. Sample size

Sample size of the research consist of 199 respondents from various universities, industries and government entities in Kuching, Sibü, Bintulu and Miri of Sarawak. From Kuching, there are 56 respondents in which 50 were chosen from industry, three respondents from government and three respondents from universities. From Sibü, the total number of respondents is 47 with 45 coming from industry, one from policy and one from university. Besides that, Bintulu is with 48 number of total respondents where 45 is on behalf of industry, two from policies and one from university. Lastly, for Miri the total number is 48 respondents with 46 on behalf of industry, one from policy and one respondent from university.

5.3. Data collection procedures

The main instrument used for data collection is the questionnaires. The questionnaires consisted of a series of open ended and close ended questions. The questionnaires were developed based on Teshager (2014), and modified accordingly based on the research objectives. Before collecting the data, a letter of permission to conduct the study was given to the selected entity before proceeding with data collection by face to face interview for a duration of approximately 15 minutes. The name of the entities involved is confidential and will not be revealed.

5.4. Data Analysis

Data analysis in the study was analyzed using a SPSS computer software. Type of analysis used is descriptive analysis, where the raw data was transformed into a new summary of format that is easier to interpret and chi square test is used to find the differences between groups.

6. Findings

Results in the study of the quantification of university - industry - policy entities linkage structure on environmental matters are based on the questionnaires by the respondents in Sarawak.

6.1. The collaboration pattern in Sarawak

Generally, from the graph in Figure 1, Sarawak is still lacking in collaboration work as the number of entities that have ever conducted collaboration in regards to environmental matters are only 37%, while the remaining 63% states that there is no collaboration in regards to environmental matters. Figure 1 is the graph of the presence of collaboration linkages in Sarawak.

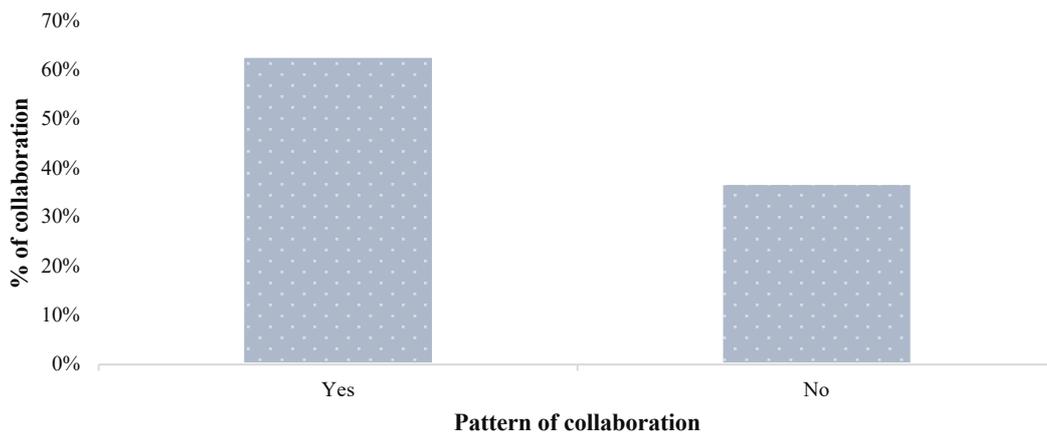


Figure 01. The present of collaboration among the entities related with environmental matters in Sarawak

From observation, the graph clearly shown that most of the respondents rated that there are still lacking of collaboration among the entities related with environmental matters in Sarawak. This is because collaboration on environmental matter is not a priority. Priority setting is not an easy work to do. Universities, industries, and policy entities have been fighting on their target agendas and goals (Cooke et al., 2015). As said by McAneney et al. (2010), university staff are too keen on focusing only on publication, research, while neglecting the practice of addressing real issues through collaboration. Based on surveyed, the present of linkages among entities is low due to the low commitment to collaborate, especially among the industrial as their target is to gain more profit and neglected the environmental matters. As collaboration progressed, priority setting must be developed and implemented accordingly. It can be done by enlarging the platform for negotiation and debate, while enabling the sharing of knowledge among the entities (Cooke et al., 2015). Be it as it may, nowadays, there are raising numbers of collaboration among the entities in

regard to environmental matters in Sarawak. For example, in March 2019, there are nine organizations that have written a memorandum of understanding (MoU) with the Department of Environment (DoE) in objective into tackling the environmental issues in Sarawak. The MoU would signify the role of DoE in enhancing smart and strategic partnership with those from various agencies. With that, it is hoped that there is public awareness on the importance to protect the environment.

6.2. The level of collaboration in Sarawak

The level of linkages is divided into five scales of rating that are infant, semi building, building, semi mature and mature. For infant, there are a total number of 99 respondents out of 199 respondents who stated that the level of current collaboration in Sarawak is still in infant stage. The highest number of respondents that are categorized under infant is from Miri (33.70%), Sibü (29.5%), Kuching (21%) and Bintulu (15.8%). Bintulu region revealed the highest semi building stages with 38%, followed by second highest 29% from Kuching, 24% from Sibü and Miri as the lowest (9%). As for building level of collaboration, Kuching region held the highest vote as 32.6% of total respondents agreeing that the level of collaboration is at building stage. The second highest vote for building came from Bintulu (30.2%) followed by Sibü (18.6%) and Miri (18.6%). On behalf of semi mature there are only 13 respondents who pointed out that the level of collaboration in Sarawak is consider as semi mature. The majority vote for semi mature came from Kuching (54%), followed by Bintulu (23%), Miri (15%) and Sibü (8%). Lastly, the finding that mentioned the status of collaboration is at a mature stage, 36% which is the highest coming from Kuching, followed by Bintulu (29%), Miri (21%) and Sibü (14%). Figure 2 illustrates the level of linkages and area of study.

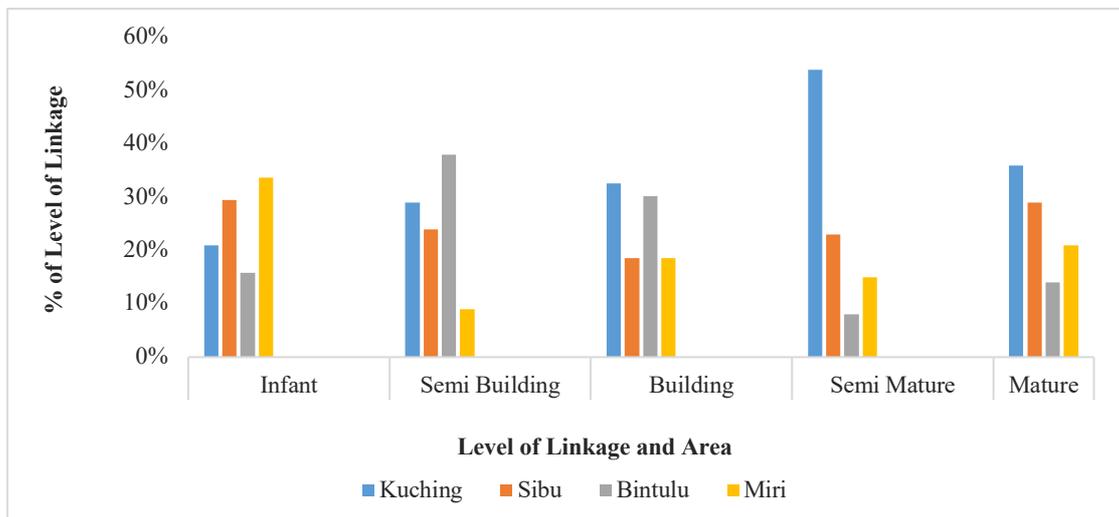


Figure 02. The level of collaboration on environmental matters among university, industry and policy entities in Sarawak

When taken the average linkages in Kuching, Sibü, Bintulu and Miri, it was found out that the highest level of linkages is in the infant stage. Therefore, most of the respondents from the survey perceived that the collaboration level based on environmental matters in Sarawak is still early and struggling to hike. However, from the observation, Kuching has a more encouraging state of collaboration than the others.

This could be because Kuching is the capital city in Sarawak, thus more of the collaboration work are focused in the head offices of Kuching. As said by one of the Sarawak's Minister in a conference held in Kuching, he mentioned that the government is encouraging of the collaboration and coordinate all the research projects that have been conducted all this while other than they being ended up in theory but no commercial values. This is evident that there are a lot of researches being done on environmental matters but most of them are just research that end up in a paper but not being implemented. He also mentioned that Sarawak is one of the hot spot in the world, and hoped that the rich bio- resources could be harnessed in a sustainable manner (David, 2018). Therefore, collaboration is the perfect tools for this, as collaboration among many entities has always be the solid pillar for environmental management (Sulaiman et al., 2019). Regardless, from the survey, there are still several barriers listed that challenge collaboration work. One of the biggest barrier that challenge collaboration is most of the respondents does not think that collaboration is a priority. This is because they thought that they can handle environmental problems only on their own as there is a weak attitudinal alignment between partners in whereby those entities who collaborate does not know how to develop working together attitudes (Brown & Duguid, 2000; Hartman et al., 2002).

6.3. Importance perception of collaboration in Sarawak

The finding revealed that none of the targeted study areas has rated collaboration as not important. On the other hand, majority of the respondents perceived collaboration to be very important. This can be observed in Kuching as 71% stated that collaboration to be very important and 29% stated that it is important. In Sibü, the study found that 60% stated that collaboration to be very important and 40% to be important. 62.5 % rated very important in Bintulu region and 37.5% rated important. However, less percentage of very important perception obtained in Miri, about 58%, while 42% rated that it is only important. Figure 3 displays the level of importance of collaboration against area of study.

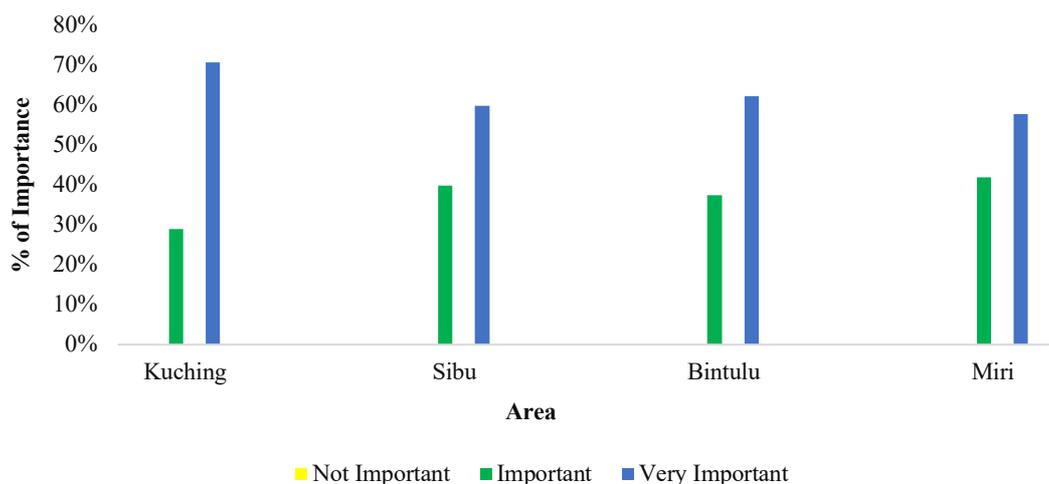


Figure 03. The collaboration perception related with environmental matters among the cities in Sarawak

Regardless of what the percentage is, the graph highlighted that collaboration among the entities to tackle environmental matters is suggested to be very important in Sarawak. The finding is supported by Gajda (2004), that mentioned that collaboration is vital among organizations as the approaches was viewed

as a tool for success in sustaining a clean environment. Many environmental problems have suggested that federal controlled efforts are not enough and should not be the responsibility of only one central government to manage (Durant et al., 2004; John, 1994). Therefore, environmental collaboration among related entities is very important. The preference or call to collaborate, encouraging collaboration or not clearly mirrors the critical choice to achieve specific goals (Koontz & Thomas, 2006). There are many policies developed by the Malaysian government on which emphasize on the importance of environmental collaboration. For example, in one of the strategies of the eleventh Malaysian Plan is to instill a sense of cooperation between the industries and universities towards environmental matters through an integrated effort (Eleventh Malaysian Plan, 2018).

6.4. Chi Square Test Table

Table 1 is the Chi square test for the pattern of collaboration, importance of collaboration and level of linkages among university, industry and policy entities on environmental matters in Sarawak.

Table 01. Chi Square test of collaboration linkage

Variables	Rating	X^2	P
Pattern of collaboration	Yes No	7.14	0.068
Importance of collaboration	Not Important Important Very Important	2.44	0.485
Level of linkages	Infant Semi building Building Semi mature Mature	24	0.02

*Significant $P < 0.05$

Data analysis of chi square test prove that there are no significant value between the pattern of collaboration (Yes/No) as the P value is more than 0.05. Besides that, there is also no significant difference on the importance of collaboration as the P value is 0.485 and more than 0.05. However, for the level of linkages, there is significant differences.

7. Conclusion

Collaboration is an approach that has been introduced to reduce the gap between entities to progress and also to ensure sustainability. As there are a number of benefits of collaboration, the Malaysian government are implementing policies to encourage collaboration. However, despite there have been many studies of collaboration, little has been published on what exactly is the level of collaboration, specifically dealing with environmental concern in Sarawak and little consideration has been given in examining the level of structural linkages among university, industry and policy entities. This raises a question of the study that is to look on the level of collaboration in Sarawak on environmental matters. This research has looked into the university, industry and policy linkages at a surface level. The conclusion is, the level of existing

collaboration in Sarawak is at an infant stage and most collaboration involving environmental matters is still new. To reap the benefits of collaboration, there must be a strong commitment, hard work and knowledge. The findings also concluded that most of the entities in Sarawak perceived that collaboration is very important and useful to tackle environmental matters. Future efforts are needed to increase more collaboration work on environmental matters. On the other hand, the research is subjected to several limitations. The limitation includes are the cooperation from the respondents. This is because, not everyone from the organization or company are willing to cooperate in the survey. Second limitation is the lack of previous research study on the particular topic. Thus, it is vital that more research or study on collaboration are conducted and researched to have a deeper understanding of the concept. Third limitation is, the number of sample size of respondents from university and policy could not match up the number of industries as there are more industries than policy and university entities in Sarawak. To address the issue, a higher sample size should be considered to increase the accuracy of data. Lastly, it is suggested that the government should enforced a strict policy on collaboration and reward those who managed to collaborate and contribute to environmental benefit.

Acknowledgments

The paper was prepared with the financial support of the Geran Universiti Putra Malaysia GP-IPS /2018/9649100 under grant no 9649100. Many thanks to my supervisory members for tremendous assisting and continuously support during the study period.

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