THE VIABILITY OF TRADITIONAL FARMING SYSTEM AMONG THE LOCAL HOUSEHOLD COMMUNITIES AT BENGOH RESETTLEMENTS SCHEME (BRS)

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A dissertation submitted in partial fulfillment of the requirements for the degree of Master in Environmental Management (Development Planning)

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2015
DECLARATION

I hereby declare that the work in this study entitled “The Viability of Traditional Farming System Among the Local Household Communities in Bengoh Resettlement Scheme (BRS)” is my own except for quotations and summaries that have been duly acknowledged.

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ACKNOWLEDGEMENTS

With humility and faith, I thank the Almighty Lord for giving me the strength and patience to complete this dissertation.

I would like to acknowledge University of Malaysia Sarawak (UNIMAS) for giving me the opportunity to participate in the SLUSE program. Also, I would like to express my deep appreciation and gratitude to my supervisor Dr. Goy Siew Ching, who gave me valuable comments, guidance, and suggestions that I will treasure endlessly. Great appreciation to Assoc. Prof. Dr. Ahi Sarok for his supports and guidance as my internal examiner.

My thanks is also owed by all the staffs at Centre for Technology Transfer and Consultancy (CTTC) for the encouragement given by them. In particular, I am very grateful to the SLUSE coordinators Dr Tay Meng Guan, Mr. Azizul Jamian and Mr. Nicholas Ghani for their leadership and support throughout the period of my study. A special gratitude to Prof. Dr. Gabrial Tonga Noweg for his willingness to guide me throughout this study. Without him, I would not be able to gather data and pursue with this study. To my entire classmates of SLUSE Cohort 13, thank you for your friendship, support, and sweet memories which I will value forever.

Not to forget the people in Bengoh Settlement Scheme (BRS) for their priceless willingness and sacrifices in providing the best cooperation that they can deliver to me. Thank you for your warmth.

Last by not least, I wish to acknowledge my appreciations to my dearest family members for their time, financial and moral support, sacrifice and love that will be forever cherish. Thank you so much Didi, Mak & Pennie!
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<tr>
<td>BAHEP</td>
<td>Batang Ai Hydroelectric Power</td>
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<tr>
<td>BCR</td>
<td>Benefit Cost Ratio</td>
</tr>
<tr>
<td>BD</td>
<td>Bengoh Dam</td>
</tr>
<tr>
<td>BHEP</td>
<td>Bakun Hydroelectric Power</td>
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<tr>
<td>BRS</td>
<td>Bengoh Resettlement Schemes</td>
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<tr>
<td>CBA</td>
<td>Cost and Benefit Analysis</td>
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<td>DOA</td>
<td>Department of Agriculture</td>
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<td>EIA</td>
<td>Environmental Impacts Assessment</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>IRR</td>
<td>Internal Rate of Return</td>
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<tr>
<td>JKR</td>
<td>Jabatan Kerja Raya</td>
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<tr>
<td>MLD</td>
<td>Millions of Liters per Day</td>
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<td>MYR/RM</td>
<td>Malaysian Ringgit</td>
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<tr>
<td>NBBI</td>
<td>New Brunswick Bible Institute</td>
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<tr>
<td>NCR</td>
<td>Native Customary Right</td>
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<tr>
<td>NPV</td>
<td>Net Present Value</td>
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<tr>
<td>PVB</td>
<td>Present value benefit</td>
</tr>
<tr>
<td>PVC</td>
<td>Present value cost</td>
</tr>
<tr>
<td>RCF</td>
<td>Rainforest Conservation Fund</td>
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<td>SALCRA</td>
<td>Sarawak Land Consolidation and Recreational Authority</td>
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<tr>
<td>SPU</td>
<td>Sarawak Planning Unit</td>
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<tr>
<td>TPVB</td>
<td>Total present value of benefit</td>
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<tr>
<td>TPVC</td>
<td>Total present value of cost</td>
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<tr>
<td>VIDP</td>
<td>Village Integrated Development Project of Padawan Cluster Programme</td>
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<tr>
<td>WTA</td>
<td>Willingness to accept</td>
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<td>WTP</td>
<td>Willingness to pay</td>
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ABSTRACT

This study examines the viability of traditional farming system among local household communities in Bengoh Resettlement Scheme (BRS) that is limited to three acres of land per household, the identification of their previous and current livelihood strategies, suggested land utilization pattern on the new land using their common way to run the agricultural activities and projection of cost and benefit on the land utilization pattern.

A random sampling of 40 respondents were selected through face-to-face interview using semi-structured interview schedule. Focus group discussion was also executed to gain information on the typical agricultural practices among the farmers. This study was also supported by secondary data obtained from several official meeting reports on the progression of the resettlement projects. Cost benefit analysis was employed to determine the viability of agricultural farming system in which NPV, BCR and IRR was calculated by using Microsoft Excel.

The study discovered that disrupted livelihood strategies in the BRS were attributed from challenges in seeking for new employment (60%) in which it is related to limited natural resources (27.5%). Access to sufficient amount of land is vital for the local communities to support their living. Small area of land restricts them to cultivate agricultural activities especially using traditional farming system.

In terms of traditional farming system proposed, this study found out that a mixed-pattern of pepper vines (230 vines) and 10,000 cobs of maize planted on 1.5 acres of land respectively is the most viable to the local communities. With a discount rate at 10 per cent, the NPV throughout 10 year period was projected RM22,508.43, BCR of 1.39 (more than 1), IRR of 28 per cent (more than discount rate) and the payback period is estimated on the sixth year after planting these two crops using the traditional farming system.

Keywords: Traditional Agriculture, Bengoh, Viability, Pepper
ABSTRAK

Kajian ini bertujuan untuk menyiasat daya maju sistem pertanian secara tradisional di kalangan masyarakat tempatan di Skim Penempatan Semula Bengoh (BRS) dimana keluasan tanah dihadkan kepada tiga ekar. Untuk mencapai tujuan utama kajian, mengenalpasti strategi kehidupan sebelum dan semasa berpindah, mengenalpasti corak penggunaan tanah yang ingin dilakukan oleh petani serta amalan pertanian yang biasalah dijalankan juga turut disertakan dalam kajian ini.


Kajian ini mendapati bahawa perubahan strategi kehidupan mereka berpunca daripada kesusahan untuk mendapatkan pekerjaan baru (60%) di mana ia turut berkaitan dengan kekurangan sumber semulajadi (27.5%). Keluasan tanah adalah penting bagi masyarakat tempatan untuk menjana sumber pendapatan mereka. Tanah yang kecil menghalang penduduk untuk mendapat pendapatan yang cukup bagi menampung kehidupan mereka.

Aktiviti pertanian traditional yang terdiri daripada lada sebanyak 230 batang dan 10,000 tongkol jagung pada 1.5 ekar setiap satu dilihat sebagai aktiviti yang paling menguntungkan berbanding dengan aktiviti pertanian yang lain. Dengan kadar diskaun sebanyak 10%, NPV sepanjang tempoh 10 tahun dianggarkan sebanyak RM22,508.43, BCR sebanyak 1.39 (lebih daripada 1), IRR 28% (lebih daripada kadar diskaun) dan tempoh bayaran balik dianggarkan pada tahun keenam.

Kaca Kunci: Pertanian traditional, Bengoh, Keuntungan, Lada
CHAPTER 1

INTRODUCTION

1.1 Background

Land has been and always will be transformed into several different purposes so as to supplement the development process. One of its major transformation is for agricultural purposes, and this has often lead us to compare and weigh the costs and benefits of such decision. Pearce and Moran (1994) highlighted that there are comparatively more and more land utilization for agricultural activities in Asia thus triggering lots of concern particularly in South East Asia. This is because more than half (67%) of the rainforest land in Asia has been converted to agricultural land, followed by 38 per cent in Africa, and 38 per cent in South America (RCF, 2010).

Agricultural activities are understood as the process of utilizing natural resources to produce goods and materials for human needs. Deemed as one of the earliest economic activities in the world, the agriculture sector has reigned within the core of livelihood strategies especially among the rural communities of developing countries like Thailand, Vietnam, Philippines and Malaysia. In these countries, agricultural practices were conducted in traditional ways and it has been practiced by most of the rural communities since their forefathers. Like any other developing nations, Malaysia depends very much on agriculture sector especially within the context of rural development. Current statistic
indicate that agriculture sector contributes substantially to the national Gross Domestic Products (GDP) as exemplified by the states of Sarawak about 19.6 per cent, followed by Sabah with 17.9 per cent and Johore with 14.1 per cent (Department of Statistics, Malaysia). However, the contribution of agriculture to the national GDP showed a declining trend from 2011 to 2013 (Figure 1.1), although there is an increase in production from 2012 to 2013 of about two per cent (Figure 1.1). As for Sarawak, it is still very much dependent on agriculture and its natural resources as the main economic drivers (SPU, 2015) of the state.

![Figure 1.1](image.png)

**Figure 1.1** Contribution of agriculture in Malaysia’s GDP from 2009 to 2013

Sarawak is considered to be the biggest state in the country and is blessed with abundant land to generate economic benefits from agricultural activities. With the highest number
of job of about 10,649 available in the agriculture sector in Sarawak (SPU, 2015), this is yet another proof that indeed agriculture remains very vital to the state’s economy.

For Sarawak, the rural communities still largely practice traditional agriculture such as planting of wet paddy and hill paddy, pepper and other short term cash crops. However, there are numerous effort made by the authorities in modernizing agricultural practices and commercializing them especially in the development of rubber mini estates, oil palm mini estates, and wet paddy on a larger scale of about 50 hectares and more (Annual Report 2011, Department of Agriculture, Sarawak). However, due to land fertility, land size, and available infrastructures, farmers are unable to modernize or commercialize agriculture. This is rampant especially in the very rural areas, and thus, only subsistent agriculture is practiced. The subsistent agriculture is unreliable especially when crops fail and this could lead to serious food shortages in which affects all household members (Dixon, 1990).

Placing value in several land utilization is not an easy task. The value of such utilization is usually expressed using monetary value and is measured by the preference of willingness to pay (WTP) and willingness to accept (WTA) of the consumers. Both indicators show the partialities of an individual over something whereby WTP is linked with gains and WTA with losses. Hence, the gains and losses of an individual able to be measured, thus it can be used to determine their wellbeing. The viability of any land utilization is required in order to measure the benefits and losses to the consumers. It is an important element within the scope of project appraisal that measured the capability for particular solutions to satisfy the desired outcomes. In proposing a project, the viability states the outcome that is prudent and profitable comparing with its associated cost, time,
quality, resources availability, and manpower requirement. In other word, for a particular development to be implemented, the revenue generated from the development must exceed the cost of undertaking the development (Scottish Government, 2010).

1.2 Bengoh Dam Resettlement Scheme

In August 2009, Kuching city experienced water rationing when water shortage became critical during drought season (The Star, 2009). On the other hand, with the occurrence of flood during the wetter months of December to February, it is critical for the State to make sure that water supply is sufficient to fulfill the demand of the city throughout the year (Nyambar and Bong, 2010). As a result, the State government initiated the construction of a water reservoir dam to supply sufficient water for the Batu Kitang Water Treatment Plant (BKWTP) in order to meet the increasing water demand aligned with the expanded population in Bengoh, Serian, Samarahan and nearby areas.

Bengoh area was chosen for this project due to its suitable location situated at the upstream of Sungai Sarawak Kiri, the source of water for BKWTP. The dam is located in the island of Borneo, Penrissen District, about 40 km south of Kuching, Sarawak and about 30 km upstream from exiting BKWTP. With the size of 127 km² catchment area, the dam is expected to produce around 2,047 MLD of raw water by the year 2030 when the demand for water supply in Kuching is expected to be 2,000 MLD by then (The Borneo Post, 2009).
As documented in the Environment Impact Assessment (EIA) Report (2008), as a result of the Bengoh dam project, a lake will be created and will provide a wide range of tourism attractions. This augment well for the local communities and complement the facilities already in place in the Padawan area such as the Borneo Highlands Resort and the longhouses at Kampung Benuk and Annah Rias (EIA Report, 2008). In addition, this project will contribute considerably towards the Rural Growth Centre (RGC) and Village Integrated Development Project of Padawan Cluster (VIDP) programmes which the government has initiated in the surrounding area to improve the quality of life of the communities in the area including agricultural and tourism development (EIA Report, 2008). One of them is the development of Bau-Semadang Road Project, which comprises a 12.4km access road into the mountainous hinterland to Kampung Puruh Semadang/Kampung Puruh Garung in the Padawan District, Kuching, as well as concrete bridges over Sungai Krokong, Sungai Raden and Sungai Sarawak Kiri, proceeded according to schedule. By September 2012, the completed road is expected to provide easy vehicular access to the Bengoh Resettlement Scheme (BRS) area (Naim Annual Report, 2011).

However, the villages of the Bidayuh communities are surrounded by the identified water catchment areas. Four affected villages are Kampong Taba Sait, Kampong Pain Bojong, Kampong Rejoi and Kampong Semban as shown in Figure 1.2.
Note:

On 27th October 2010, Naim Holdings were awarded the contract to construct the infrastructure for the Bengoh Resettlement Scheme by Jabatan Kerja Raya Sarawak (JKR). This project comprises a mini-township with full urban amenities and infrastructure to provide comfortable permanent homes for the people resettled under the Bengoh Dam project, for which Naim Holdings were also the main contractor. The 324 acres site will accommodate the four kampongs (villages) and provide homes for more than 200 families. A further 704 acres of agriculture land will be prepared for allocation to the
 resettled families. The scope of works also includes paved roads, gravel roads for the agriculture area, a water supply system, and electrical services.

(Naim Annual Report, 2013)

Based on the note above, Naim Cendera Holdings was the developer who are responsible for the construction of facilities such as new houses and road for the settlers of the scheme. With respect to income improvement, the Department of Agriculture (DOA) Sarawak was in charge of planning for the agricultural projects that can be developed on the compensated land given to the affected communities.

One of them is rubber mini estate project that will cover about 250 hectares of land. This project is intended to provide income and job opportunity for the settlers. It also aimed to upgrade the rural agricultural sector by using high technology such as machines, new rubber clones which can produce high quality latex and timber as well as agricultural technology that yield higher productivity. The mini rubber estate project is intended to optimize land use which may not be suitable for food crops.

The DOA Sarawak also suggested cash crop projects to secure the food supply for the settlers while diversifying their source of income. However, this project can only materialized if the state government compensate the affected communities with new land besides the existing three acres of land. Other agricultural activities planned at BRS include poultry, rearing and aquaculture projects. These projects are intended to train and exposed these farmers in commercial farming practices and to understand the application of modern farming technology.
Other than focusing on income generation, the DOA Sarawak also planned to develop the community with physical infrastructures such as road and bridges to facilitate the transport of agricultural inputs and products to market. Furthermore, the DOA Sarawak proposed human resource development training for the affected communities. This training aims to equip participants with better knowledge and skills in agriculture. These include advisory services, training in agricultural techniques, procedures, and proper agricultural practices. The methods used consist of training courses, motivational dialogue, and study visits.

1.3 Problem Statement

This study aims to analyze the viability of traditional farming system practiced by the communities in Bengoh Resettlement Scheme (BRS) area. The importance of this study is that it raises essential questions on the impact of development implemented by the state government on the indigenous people, a group of society who has been identified as being in need of change and to be brought closer to urbanization and modernization via resettlements.

Dam projects often take place in the interior part of a country, and as a result, it often affects the livelihood of the affected community living around it. Likewise, Bengoh Dam is located in a remote part of Sarawak, and the construction involves the displacement of the local Bidayuhs. Due to this development, the locals are required to move not only from their old home but also from their traditional livelihood style and belongings. They
have to sacrifice their agriculture land, consequently, losing one of their main sources of income and food supply merely to make way for the Bengoh Dam project. The state government has taken the initiative to help the villagers by compensating each of the affected household with a new house to settle down, three acres of land, plus some cash. However, the amount of compensation is believed to be inadequate to sustain them in terms of food security and income source.

It is often argued that development project will provide employment to the local population. The construction of dam required high number of laborers and the local community could have the opportunity to work there. While employment created from constructed dam is momentary in nature, the disturbance to local people from their sources of livelihood contrariwise, is permanent. Referring back to other dam development, Jehom (2009) reported that the employment rate has failed to secure the livelihood security to the affected local people. This is because most of them were unskilled, hence, they only fit only for employment in construction jobs, specifically in building the dam. Eventually, they will return to what they know best, that is farming.

Traditionally, local communities depend on forest and farming for livelihood strategies. For years, traditional shifting agriculture is very common among the people in Sarawak. It has been a major source of income for rural dwellers and the key to food security. Rice cultivation and mixed crop cultivation for the whole year round had been enough to supply the farmer and his family with food. Cash crops like pepper, rubber, and cocoa were introduced to improve the livelihood of the local community.
Owning a land for agricultural activity is very important to the local community. It is not only to support their food sources but it also defined their background and culture. Generally, the local community among BRS adopt traditional farming in their farming practice. The question arise here is: does the traditional household farming among the local communities in BRS economically viable? A total of three acres of land is claimed not to be sufficient to generate income for the farmers especially for those who wanted to cultivate rice. As noted by Mak (2010), the size of the land holding is important to the viability of cultivation of rice as well as many other crops. Even though with the diversification of agricultural activities such as paddy farming, fruit cultivation, poultry, and fishing, it is impracticable to expect the affected communities to depend solely on three acres of land to earn their living. The communities can plant paddy and vegetables on their three acres plot for their daily consumption but cannot cultivate enough cash in commercialized food production and for extra income.

1.4 Goal and Objectives of The Study

The goal of this study is to examine the viability of traditional household farming system among the Bengoh Resettlement Scheme (BRS) community that is limited to three acres per household. In order to meet the goal of the study, the following specific objectives will be answered.

1. To investigate the previous livelihood strategies in relation to the traditional farming system among the local communities in BRS.
2. To determine the land utilization pattern for traditional farming proposed by the community of BRS

3. To estimate the cost and benefit of the land utilization pattern according to local communities in regard to the traditional household farming system.

1.5 Significance of The Study

Assessing the cost and benefit of existing farming systems will inform farmers which farming system is most efficient in generating income for living. This would be benefit for farmers in resource allocation decision and bringing better quality of livelihood. In determining the viability of an investment, it is important to understand the labor engagement of farming systems to ensure suitable development intervention.

Most of the affected Bidayuhs are farmers and with only three acres of land size per household with lack of proper planning, it might not be sufficient to sustain their new livelihood. On the other hand, for the rural people that agreed to move in order to give way for development, it means that they may no longer possible to rely on their traditional source of income, especially from the forest and agricultural activities for living. Hence, this study could serve as a guide to help the affected community identifying suitable crops to be planted on the compensated land and ensure sustainable livelihood in the new location.

Moreover, the findings of this study will provide some indications of financial viability of the proposed farming practice/management regime to farmers, community leaders,
resource managers, and policymakers that involved in Bengoh Resettlement Scheme. As most of the affected people are farmers, the financial appraisal provides a guideline for it the local people to determine which agriculture activity will generate higher income and also deliver a recommendation to the policymakers in providing proper assistance to affected communities.

1.6 Scope of The Study

The study was conducted at Bengoh Resettlement Scheme (BRS) area that accommodated four affected villages namely Kampong Bojong, Kampong Taba Sait, Kampong Semban and Kampong Rejoi. The study is focused on the traditional farming system practiced by the villagers on BRS and the pattern that they planned on their compensated land.

1.7 Limitation of The Study

The study highlighted on the viability of traditional household farming that will be adopted by the local communities of BRS on their compensated land; hence, it does not fully signify the viability of traditional household farming specifically to the local communities in Sarawak that involved in the resettlement program due to development of the region. Besides that, every village or rural area that situated at diverse geographical background will have different culture and environment, therefore the findings of this
study may be definite applicable in all conditions. Furthermore, the reliability if this study also depends on the willingness of the respondents to provide an honest and accurate cooperation during the interview session. Also, it must be noted that this study has to be completed within four months. Due to this constraint, a systematic random sampling was adopted to select the respondents from the population of interest.

Nonetheless, this study can be implement as a guideline or reference for future study dealing with the resettlement of rural population in order to give way for development of the country.

1.8 Definition of Terms

Several terms employed in this study will be explained in the context of this study. The definition given here is based on the understanding and perception accepted by the researcher.

1.8.1 Traditional Farming System

Traditional farming system is an agricultural system in which the farmers are employing common agriculture practices without the presence of machineries and intensive labours.
1.8.2 Viability

The term viability in this study means the capability of traditional farming pattern proposed by the local communities of Bengoh Resettlement Scheme (BRS) to sustain their income source.

1.9 Conclusion

Overall, the first chapter of this study explains the background of the study that includes the problem statement and the aim of the study. The significance of study was derived through identified problem statement and aim of the study. The definition of terms namely traditional farming system and viability presented in this chapter will allow readers to understand the overall goal of the study before continuing with next chapter.

Chapter two is reviewing the literatures from previous studies in regard to this study. It comprises the impacts of new resettlement on local community such as challenges faced by them when adapting new livelihood strategies at new resettlement as well as risk of attaining new employment. Related case studies also includes in this chapter as a guideline to complete the study.

Chapter three describes the methodology employed in this study. It outlines the details of study procedures, populations of the study, data collection methods, instruments required and statistical techniques conducted in analyzing data.
Chapter four is for findings and discussion of the study. It will deliberates further on the traditional farming system practiced by the respondents before they moved to the new resettlement. Also, the study is attempt to seek the challenges faced by them after they moved to BRS particularly the viability of traditional farming system among the local household community of BRS on their compensated land.

Finally, the last chapter of this study is conclusions and recommendations of the overall study. In this chapter, the study will answer the objectives of the study in order to produce a relevant study.
CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter provides a basis to develop the theoretical framework of this study. It outlines the significant literature on fundamental social and economic issues pertaining to new resettlement attributable to a concerned development project. This chapter also aims to identify how the community of the new resettlement adapt their traditional livelihood strategies in the transition process towards modernization. Several case studies on resettlement schemes due to the dam constructions in Sarawak are reviewed.

2.2 Agriculture

Engaging in agriculture activities form a part of the basic livelihood strategies for the rural community (Cramb and Windle, 1997). It is a complex system which begins with the presence of natural resources and involves farms, agribusiness, and governmental organizations to provide products of the land to consumer (Casavant, et al., 1999). Agricultural works usually requires abundant land to be converted to useful land utilization practices as well as several internal and external inputs to support the activities. Historically, agricultural activity is one of the oldest economic activities around the world.
Since then, its role as income sources and also in rural economics has been greatly recognized in tandem with the development of human civilization. Nevertheless, such agricultural activities would be defined according to different kind of world economic situations, and it might be influenced by the political system as well as the asset ownership patterns of a country.

2.2.1 Traditional Farming System

Traditional farming is often considered as a step between the local hunt-and-gather practices, which provides the communities with subsistent levels of food, and the practices of modern agriculture, used for mass-production of food for global distribution (Jeeva et al., 2006). This practice has developed a balance between meeting our present needs, conserving natural resources, and protecting the environment for the benefit of our future generation. Nonetheless, NBBI (1998) claimed that traditional agricultural approaches are not practical for mass food production although it accounts for a substantial amount of local food production in the developing world.

Generally, farming practices can be grouped into two main types namely traditional and modern practices. The term “traditional farming” refers to a form of farming practices that had been carried out in countries where agrarian is the dominant employer, which includes those who are self-employed (Ghatak and Ingersent, 1984). Acknowledged as “organic farming” (FAO, 2002), most traditional farming practice requires less chemical inputs but utilize manpower extensively and natural capitals such as land and water resource.
Formerly, the focus of conducting traditional farming was for family consumption especially for the community that depends on agricultural production. It was also required for local needs to decrease the dependency on imported resources. As mentioned by Gliessman (1990), traditional farming allows the simultaneous satisfaction of local needs together with a significant contribution to demand on a larger scale.

### 2.2.2 Characteristics of Traditional Farming Practices

The practices of traditional farming are diverse, but they have some common characteristics. Norton and Alwang (1993) summarized the key points of traditional farming practices driven by several factors such as role of crops, size of agriculture, market price and the level of dependency of external inputs on the productivity.

Basically, the characteristic of traditional farming involves with small scale of agriculture with little peasants who operate their own farms. The farming and family decisions regarding the agricultural activities are often intermixed. Besides that, in the traditional farming practice is also characterized by the fact that the agriculture production is mostly for own consumption and the surplus will be sold or traded at their villages or nearby areas. The farmers respond quickly to market signals whereby changes in the local economy will take place when there are changes in labor market and agricultural products market outside the village. It must be emphasized that farmers who practice traditional farming do not rely so much on external inputs in terms of energy and materials, but often make use of locally available resources than expensive inputs in their production.
Traditional farmers are rational in the way of running their agricultural activities, but most of the time they are afraid of taking risks probably due to their ignorance. For instance, the application of modern agricultural practices have difficulty to be accepted because they will assume that those modern machines cost high investment and cannot promise a good production.

2.3 New Resettlement Impacts on Local Community

Resettlement is very common especially in developing countries. It is one of the methods commonly implemented by the government to modernize the rural community aside from achieving the aim of the project. Resettlement scheme can be grouped into two major types: voluntary and involuntary. Both schemes are purposely meant to increase production, alleviate socio-economic and environmental challenges as well as access to workforce for production (Mulugeta and Woldesemait, 2011). Involuntary resettlement, as oppose to voluntary, is a forced form of resettlement attributed to forceful situations such as environmental hazards, development projects, and conflicts (Gebre, 2004). It happens when it is forced on people by an external agent in controlled manner due to external circumstances which force them to do so. The factors allowing involuntary resettlement to happen comprise scarcity and variability of rainfall, population pressure, depletion of natural resources, urban upgrading, development of infrastructure, expansion of farmlands, and social conflicts. Economic development activities such as new resettlement scheme often change the physical and social environments in targeted areas.
For planners, it is vital to foresee the types of changes which might happen and to self-assess the mitigation of negative impacts and promote positive impacts for the sake of the people and communities of the concerned areas.

Resettlements can be recognized as a significant issue for the project and is likely to be the controlling factor in the programmes particularly for reservoir filling. Quoting WCD (2000), numerous studies on resettlement programs have revealed the repeated failure is not only due to lack of attention on physical relocation process, but also the economic and social development of affected local communities. These negative social impacts of the dams revealed a universal and systematic failure to evaluate the range of potential negative impacts on displaced and resettled people as well as the downstream communities. It was estimated that 40-80 millions of those affected by dam construction projects worldwide have been displaced while the livelihoods of many more living downstream were not recognized. The mitigation, compensation, and resettlement programs were often inadequate.

2.3.1 Challenges Faced In Adapting To New Livelihood Strategies

Numerous studies have shown that resettlement could lead to a sharp deterioration particularly in their income source and production level, thus resulting in greater poverty problem. According to Martina (2011), the government of China admitted that even 1.4 million affected residents were properly relocated, the authority still failed to raise the living standards of the affected residents as a result of the construction of Three Gorges
Studies also reflected that the adverse economic and social impacts of resettlement are more severe among vulnerable community, for instance, the poor, women and ethnic minorities (Tan, et al., 2005). Williams et al. (1995) suggested that the Bakun Dam project would cause rapid changes in the way of how people lead their lives with the presence of outsiders into the area. Their economy trait will transform from subsistence to cash economy. The consequences may vary. One possible end-result is that nutritional status may be worse off and illnesses will spread. In addition, the locals will be more likely assigned to do more intensive and dangerous labor jobs due to their low education and incompetent skills, and thus leading to more accidents at the workplace (Willams, et. al, 1995).

2.3.2 Risk of New Employment

Better and highly secured employment have often been regarded as some of the promises to the affected residents after they are relocated to new place. However, with limited resources in the resettlement, seeking paid employment elsewhere seems to be the most common choice amongst them. Most of the residents are lack of skills and depend on agriculture to survive. Noting Mathur (1998) and Mahapatra (1999), those poor people who are landless and have no assets, the loss of pastures, forested lands, burial grounds and so on once used to be available for free to them resulted in significant deterioration in their income and livelihood.
2.4 Related Case Studies in Sarawak

Sarawak has embarked in high economic growth as it aspires to be the richest state in Malaysia by 2030 (SPU, 2015). Central to this transformation is the development projects to be implemented in rural areas. Dam constructions are among the development projects proposed by the state aimed to generate power energy to enhance power utilization for heavy industries as well as for the daily usage of the people. These projects are also projected to bring connectivity to the remotest places in the state as well as to upgrade the standard of the living among rural communities. However, numerous case studies have shown that these projects neither environmentally friendly nor improving the socioeconomic of affected communities. The following subsection discusses the resettlement issues based on the case study of Batang Ai (BAHEP) Resettlement Scheme and Bakun Hydroelectric Power (BHEP) Resettlement Scheme.

2.4.1 The Unfulfilled Promises

The construction of dams basically is to improve the standard of living among the citizens of nation regardless of the purposes of the dam itself either for hydroelectric power supply or to store sufficient water in order to meet with the water demands. However, the consequences of this development often affect the livelihood strategies of the local communities. The resettlement of the affected community has always been a problem. For instance, in Batang Ai Hydroelectric Power Dam (BAHEP), the affected communities were forced to relocate to the new resettlement before their new longhouse was
completely constructed. The communities were camped in temporary shelters or stayed with other families for several months. Considering that this is the first dam ever constructed in Sarawak, it is expected to encounter several obstacles and problems in the process of its preparation. The same problem was reported in the Bakun Hydroelectric Power (BHEP) resettlement process. The settlers, according to Jehom (2008), moved involuntarily to the new resettlement even before the jobs on the longhouses were completed. Although the related agencies promised to compensate them with better resettlement condition, it was reported that the conditions was relatively poor without the Certificate of Fitness. Although in the report stated that there were basic amenities in the new resettlement, however, there were serious deficiencies such as lacks of adequate sewerage system, rubbish disposal, and proper access to roads (Jehom, 2008). The worst was the affected communities were forced to pay MYR52, 000 for a very poor condition house without the Certificate of Fitness. Nonetheless, none of the household made the payment (Jehom, 2008).

2.4.2 Land Compensation

The major constraint faced by the affected communities as pointed out in both studies was unjust in land compensation which was not accorded to the needs of affected communities. In Batang Ai, some part of the land owned by the affected communities were already submerged before the process of surveying the land completed. Thus, it created considerable difficulties to estimate the amount of compensation accurately. Most of the affected communities depend on the availability and productivity of agriculture
output to survive. However, the planner failed to compensate some of them with land for paddy cultivation. To overcome this matter, the DOA allocated a total of 3077 ha of NCR land located in the downstream area of Batang Ai reservoir. Each family was compensated with 3.3 ha of land, including 0.8 ha of paddy cultivation. Sarawak Land Consolidation and Rehabilitation Authority (SALCRA) was also participated in this program by introducing a plantation scheme of cocoa and rubber to the resettlements. However, this program was unable to meet the objective because outcomes from cocoa yield was failed and the price of rubber at that time was low. Due to this matter, oil palm was introduced to the communities and to be planted on the compensated land along with paddy activity. Unfortunately, the paddy cultivation encountered failure because the paddy crops was planted near to oil palm trees, the oil palm growers were unable to slash and burn vegetation.

Similarly, for affected communities who resettled in Sungai Asap due to Bakun Dam were having problem earning a fair compensation as their land was not properly surveyed by the officers from the Department of Land and Surveys. The settlers were also reported to have problems accessing their compensation because of mismanagement and misuse of funds because before disbursement

2.4.3 Agriculture Opportunities

It was also testified that unemployment was serious because of the lack of employment opportunities unless the settlers opted for jobs in towns (Jehom, 2008). The affected
communities in BAHEP were mostly old citizens and most of them were only interested in agricultural works. Similarly in BHEP, unemployment increase after moving to the new resettlement. Even though they were compensated with three acres of land, yet the communities claimed that the proportion of the land is inadequate and unable to sustain their farming activities like they used to practice. Jehom (2008) also commented that it is unrealistic to expect the households to be able to adopt traditional farming on a three acres of land because most of the settlers have no experience or skills in intensive agriculture. Even if the settlers wanted to carry on with agricultural activities on that land, they still required sufficient and stable financial state to buy fertilizers, insecticides, and other needs for farming. Moreover, for the traditional farming of cash crops such as pepper, the settlers have to wait about three years before they can harvest their pepper trees and the inconsistent price of pepper makes life to be even harder for them (Jehom, 2008). In short, Jehom (2008) concluded that three acres of land compensated to each household in BHEP is nearly impossible to secure their income source.

2.5 Conclusion

The chapter summarized the characteristics of traditional farming system from previous studies. It also delivered the impacts of new resettlement on the affected community which mainly affected their employment particularly in agricultural field. Besides that, the chapter reviewed past case studies in regards to this study. Reviewing previous case study is essential for this study to further strengthen the empirical data of this study.
CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology employed in this study. The aim of the study is to access the viability of traditional household farming grew on the three acres of compensated land. To achieve the aim, this chapter outlines the procedures in obtaining the necessary data for analysis and discussion purposes. Specifically, the details of study procedures, populations of the study, data collection methods, instruments required and statistical techniques conducted in analyzing data are further elaborated in this chapter.

The data are collected through primary and secondary sources. The secondary data were obtained from the government agency, namely Department of Agriculture (DOA) that involves in agriculture planning and development projects for the BRS community. A semi-structured interview schedule was developed to interview the sample of the study.

3.2 Procedures of Study

This study was conducted according to the following sequences:
3.2.1 Land Utilization/Pattern Development

The first stage of the study was to identify the land utilization pattern for the cost and benefit analysis. Primary data was collected using rapid rural appraisal (RRA). Information collected for each land utilization pattern include price, quantity produce, labor, and other input used. This obtained information was based on the past experience in cultivation before moving to the new resettlement. Land utilization patterns were collected from respondents to identify their agricultural plan on the compensated land. Focus group discussion (FGD) was also conducted in order to collect comprehensive evidence about the common agriculture practices. The discussion consisted of eight farmers, and it was assisted by local translators to ease the language barriers. This study also gathered data from secondary sources, such as government publications. The fieldwork for data collection was undertaken in between November 2014 until January 2015 (refer to Appendix II).

3.2.2 Investment Analysis for Proposed Farming Patterns

After obtaining the data on farming inputs such as the price and the application of pesticides and fertilizers, an investment analysis is performed in order to evaluate the cost and benefit of traditional farming practices proposed by the BRS community. The cost and benefit analysis include NPV, BCR and IRR are calculated using Microsoft Excel and tabulated in tables shown in Appendix III and Appendix IV.
3.3 Study Population and Sampling

The targeted population of this study is the head of a household, regardless of their gender from four villages namely Taba Sait, Pain Bojong, Semban and Rejoi. Given the fact that population is defined as a total set of people or items of interest in a research project (Zainudin, 2012), the population of this study is therefore all 240 heads of households from each of the four villages. The estimated population was obtained from the Agriculture Reports, 2014. Figure 3.1 indicates the actual site of Bengoh Resettlement Scheme (BRS) site.

![Figure 3.1 The Site of BRS](image)
The affected villages are among agricultural society of smallholder farmers that cultivate traditional paddy and small scale cash crops, mainly pepper, rubber, cocoa and fruits (EIA, 2008). The most common method for agricultural activities is using traditional way and also practicing shifting cultivation on their agricultural regime.

It must be noted that this study has to be completed within four months. Due to this constraint, a systematic random sampling was adopted to select the respondents from the population of interest. For this study, the first respondent was chosen by selecting the household that falls on fifth number on the name list, followed with the next fifth name after the first respondent. Overall, a total of 40 heads of households were selected as the respondents in this study.

The breakdown of this targeted respondents according to their villages is displayed in Table 3.1.

<table>
<thead>
<tr>
<th>Village</th>
<th>Number of heads (1 head represents 1 household)</th>
<th>Number of target samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taba Sait</td>
<td>59</td>
<td>11</td>
</tr>
<tr>
<td>Pain Bojong</td>
<td>47</td>
<td>10</td>
</tr>
<tr>
<td>Rejoi</td>
<td>58</td>
<td>11</td>
</tr>
<tr>
<td>Semban</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>204</td>
<td>40</td>
</tr>
</tbody>
</table>

*Source: Agriculture Department (2014)*
3.4 Research Design

For the primary data collection, the study employed a structured interview schedule although most of the questions were open-ended (see Appendix I). The instrument was pre-tested with five of the heads household prior to the actual field survey. As a result, the interview schedule were amended to ensure the quality and reliability of the questions asked in the survey. Observation were also carried out on activities of the affected villagers and their surrounding environments to gather information that is not gained through the use of interview schedule. Data were also obtained through focus group discussion to acquire comprehensive information on the roles of land to their livelihood strategies, and the changes that they have experienced after they have moved to the new resettlement at BRS.

In addition, secondary data were obtained from minutes of official meeting on the progress of the project. Data from related agencies and organizations publications such as the government plans and budgets were gathered to support the information on the community planning and land utilization within the resettlement area and to identify which land can be used for traditional farming system.

3.5 Data Analysis

This study employs cost benefit analysis to calculate the data obtained from the study. An estimation of costs and benefits was developed based on common agriculture practices
proposed by the respondents on the compensated land. In order to estimate the cost and benefit of an agricultural pattern, several indicators such as net present value (NPV), benefit-cost ratio (BCR), and financial/internal rate of return (IRR) were applied. These indicators are useful in making a decision to support whether an investment or a project is worthwhile to be undertaken. To make a decision among mutually exclusive projects, it is preferable to execute more than one indicator as a guideline for decision making. Nonetheless, when more than one project turn out to worthwhile to be undertaken, the study will referring to the highest estimation of NPV value of the project.

3.6 Net Present Value

Net present value (NPV) is commonly used as indicator to compare the profit from different genre of investments. Likewise, the scenarios in this study was defined by different types of land utilization which commonly practiced by the BRS community. The formula to calculate the NPV is shown in Equation 1 as follows:

**Equation 1:**

\[ NPV = \sum_{t=0}^{t=n} \frac{B^t - C^t}{(1 + i)^t} \]

Where \( B_t \) is benefit as year \( t \), \( C_t \) is cost at year \( t \), \( t \) is time denoting year and \( i \) is discount rate.
The investment for a particular land utilization pattern is considered profitable when NPV is higher than 0 (NPV > 0). The greater the NPV, the higher the viability of the investment.

### 3.7 Benefit-Cost Ratio (BCR)

Another indicator employed in the study was the estimation of benefit-cost ratio (BCR) from each different land utilization patterns. If the BCR value is more than one, it can be interpreted as a positive NPV. The ratio indicates that the expected benefits of a project is the number of times larger than the costs. The formula of BCR shown in Equation 2 below.

**Equation 2:**

\[
\frac{\sum B_t}{(1+i)^t} \div \frac{\sum C_t}{(1+i)^t}
\]

where \(B_t\) is benefit as year \(t\), \(C_t\) is cost at year \(t\), \(t\) is time denoting year and \(i\) is discount rate.
3.8 Internal Rate of Return (IRR)

Another indicator to evaluate the profitability of the study was using internal rate of return (IRR). The measurement of IRR was to provide prediction to the potential profitability of investment via higher value of IRR. The higher the IRR on a project and the greater the amount by which it exceeds the discount rate, the higher the net cash flows to the investor. Equation 3 shows the IRR formula employed in this study.

**Equation 3:**

\[
\sum_{t=0}^{n} \frac{B_t - C_t}{(1 + i)^t}
\]

where \(B_t\) is benefit as year \(t\), \(C_t\) is cost at year \(t\), \(t\) is time denoting year and \(i\) is discount rate.

3.9 Conclusion

In conclusion, this chapter explains the location and the design of the study. Data was gathered through semi-structured interview schedules with 40 respondents that were selected using systematic random sampling. Also, the chapter discusses the method used (NPV, BCR and IRR) for data analysis in order to estimate cost and benefit of traditional farming system based on what the respondent have proposed. Table 3.2 summarize the
decision criteria for NPV, BCR and IRR to ensure the viability of the project, and for this study, the viability of land utilization pattern using traditional farming method.

Table 3.2  Data analysis-profit estimation

<table>
<thead>
<tr>
<th>Viability Indicator</th>
<th>Formula</th>
<th>Decision Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPV</td>
<td>( NPV = \sum_{t=0}^{t=n} \frac{B^t - C^t}{(1 + i)^t} )</td>
<td>NPV ≥ 0</td>
</tr>
<tr>
<td>B/C Ratio</td>
<td>( \frac{\sum B_t}{(1+i)^t} \div \frac{\sum C_t}{(1+i)^t} )</td>
<td>BCR ≥ 1.0</td>
</tr>
<tr>
<td>IRR</td>
<td>( \sum_{t=0}^{t=n} \frac{B_t - C_t}{(1 + i)^t} )</td>
<td>IRR ≥ r</td>
</tr>
</tbody>
</table>

B=benefit, C=cost, t=time in years or rotation/production period, n= rotation length in years, i=discount rate
CHAPTER 4

FINDINGS AND DISCUSSION

4.1 Introduction

This chapter reports on the main findings and discussions acquired from the interviews and focus group that has been conducted. The discussion contains two main sections: the empirical findings on the livelihood strategies of the BRS community before and after moving, and also the viability of the proposed agriculture activities on their compensated land. Each section contains the results and discussions for each objective leading to the conclusion of the study.

4.2 Livelihood Strategies Prior To Resettlement at BRS

This section answered the first objective of the study that is to identify the previous livelihood strategies by the BRS communities before moving to their new resettlement particularly on their method of agriculture and farming activities. To determine the previous livelihood strategies of the BRS communities and the relative importance of agriculture activities, 40 households out of a total of 204 households were randomly
selected and a face to face interview were conducted to obtain information from BRS communities.

4.2.1 **Sources of Income Before New Resettlement**

Figure 4.1 shows the main income-source of households before they were relocated to their new resettlement. More than half of the respondents (53%) generated income both from agriculture production and remittances for their livelihood strategies. Apart from agriculture production which is the most important source of income for these settlers, remittances to family are also quite significant in supplementing the overall income of these settlers. The findings also showed that about 25 per cent of the respondents were dependent solely on agriculture production for a living, while about 5 per cent of the respondents relying solely on off-farm works (odd jobs, etc..), and remittances solely about 5 per cent also. Lastly, about 12 per cent of the respondents acquire income both from agriculture production and off-farm work.
Based on Figure 4.1, it can be deduced that various agricultural activities have been widely practiced by the Bidayuh of BRS long before they were resettled at their new homes and locations. They could have cultivated various crops for daily survival and as source of income.

### 4.2.2 Number of Crops Cultivation Before New Resettlement

Figure 4.2 illustrates the number of crops cultivated by BRS community before their relocation to their new resettlement areas. As depicted in Figure 4.2, the entire settlers cultivated more than one crop, making it a diverse and dynamic farming. This allows for a variety of activities and ways in which they can make a living. A large number of
respondents (77.5%) engaged in paddy cultivation and cash crops cultivation such as pepper and rubber. Only 2.5 per cent from the respondents cultivated two types of main crops due to small land size.

![Image](image.png)

**Figure 4.2** Number of crops by households before moving

The highest number of main crops being cultivated among the respondents is of 6 types namely paddy, rubber, pepper, cocoa, various varieties of fruits and vegetables. However, all the respondents interviewed indicated that they grew paddy on their field due to its importance as a primary source of food. This is further elaborated and discussed further in section 4.2.1.
4.2.3 Paddy Cultivation

The communities of BRS practiced paddy cultivation ever since their forefathers through the Customary Rights. To them, it is more than just growing a certain food crop but as a way of life. In other words, the most prominent agriculture activities is hill paddy cultivation as it seems to shape and influence the other agricultural activities that most households are engaged in. Even though hill paddy is grown traditionally without any modern techniques, labor issue is not a problem to these farmers. For example, the whole family members can engage together in doing farming activities like paddy sowing until harvesting, thus leaving little spare labor to be allocated towards other activities like cultivation of cash crops.

The interviews also revealed that the villagers believed that cultivating paddy regardless of the type of paddy planted symbolized their origin and way of life. Paddy was assumed to have a soul. As noted by Thandee (1986), in traditional societies where agriculture is the predominant occupation, culture was formed largely through relations to plants, gardens, and agricultural fields. It denoted a close relationship that exist between farmers and the agro systems. Similarly, in traditional Bidayuh beliefs, harvesting paddy reflected a ritual responsibility rather than just an agricultural activity. It has a close relationship associated with festivals and ritual ceremonies during the calendar year. Normally after the annual harvest, Gawai celebration is celebrated by the Bidayuhs to appease the spirit of the paddy.

The Bidayuhs of the BRS started their paddy cultivation by clearing the land. It is not an arduous tasks as the land has previously been cultivated by their ancestors and the land
consist of secondary jungle. Normally, land preparation is carried out during dry season usually in the month of July and August. Here, these farmers’ slashes weeds as well as small trees around the designated farming areas, and these tasks are normally done by men traditionally using long curved blade known as *parang*. The field is left to dry before burning is done. After burning, the farmers then start to plant paddy and intercropped namely maize, tapioca, yam, and other edible plants. Next, the procedures continue to the next stage namely transplanting stage whereby during this stage, the works are mostly involve the whole community. Here, dibbling the hole for placing the seeds are normally done by men followed by the women placing the seeds inside the hole. The average time needed for transplanting is approximately eight persons per acre depending on weather and soil types. Weeding is next and it is predominantly taken over by the women of the communities. Based on information collected during interview sessions, weeding is the most tedious task in paddy cultivations and it requires intensive labor. Next, harvesting takes place normally within the month of February and March (rainy season). Typically, the farmers in BRS will harvest the paddy grains with a knife. This stage requires lots of labours as works needs to be done fast to reduce the risk of grain loss to birds and other pests.

4.2.4 Cash Crops Cultivation

Pepper and rubber are among the two common cash crops grown by the local communities. Most of the rubber farmers inherited rubber plantation from their parents and tend to continue managing these plantations using their experiences. However, rubber
seemed to consume less attention from farmers in terms of financial capital, time and labor because the trees were then old and had been cultivated since their ancestors.

In pepper crop management, most of the respondents have indicated that they were using traditional methods which is more laborious because the farmers has to clean the land using hoe, weed the ground, manure the plants and harvest the pepper berries by climbing ladders to pick the berries from the pepper vines. Previously, the farmers were using *pela* pole as climbing poles. According to respondents, the reason *pela* tree was chosen to be the climbing pole of pepper is due to its strong scent which is useful in protecting pepper from pests attack. The *pela* tree is also found abundantly in their previous villages, thus, make it the best choice for pepper vine poles. Generally, pepper is more prone to disease attack than other crops. Thus, herbicides, pesticides, and fertilizers are frequently applied, as illustrated in the pepper seasonal calendar in Appendix V. Local communities at BRS applied for subsidies seems to be influenced by the application of pesticides, herbicides, and fertilizers to reduce their financial problem. According to the BRS Subcommittee Meeting Report (2014), a total of 83 per cent of the villagers were qualified and were allocated with pepper growing subsidies. The government agreed to supply them with 200 numbers of *belian* poles for pepper support as well as subsidies for fertilizers and planting materials.

Pepper was also intensively cultivated by these BRS farmers in their previous villages due to its higher yield and better profits. Despite the high demand for pepper in the market, other factors may influence the farmers in BRS to decide whether or not to plant them. Field interviews with a local pepper cultivator, Mr. Sow ak Titeng noted that one of the main reasons he decided to grow pepper was because of his vast experience and skills in
pepper management. He explained that his family has cultivated pepper for more than 30 years and it is his responsibility to continue planting pepper for his living and maintain the family tradition.

4.2.5 Shifting Cultivation

The settlers of BRS have been practicing shifting cultivation for generations before they moved to the new resettlement. The practice of shifting cultivation involves the burning of mature forest, release of nutrients, and the planting of crops such as hill paddy or pepper, after which the land is left to fallow for forest regeneration, before the cycle repeats again (Best, 1988).

As seen in the seasonal calendar tabulated in Appendix V, the busiest times of year for pepper and rubber cultivations do not overlap with those of paddy cultivation. Hence, this makes the combination of crops very manageable as it enables the family members to grow different crops simultaneously. The respondents added that another reason that allows them to adopt this kind of system in the past was due to abundant land that they owned.

Timing of the different crop cultivations varies and it depends much on weather conditions. For example, rain could postpone the burning period and consequently the whole cycle, or can influence the rice harvesting time. Similarly, the rubber tapping is not possible to be carried out in rainy days. Under good weather, the tapping of rubber tree can be done daily, early in the morning, and all year round.
4.3 Challenges Faced By The Local Communities at BRS

“Now, we have plenty of time because we have nothing to do either in farming or other off-farm works. At our previous kampong, we have so much to do because we have more than one crop to cultivate. It was so excited then especially when it was time to harvest and then gain income from selling our products. Limited source of income and money has restricted us to start any agricultural activities on the compensated land”.

Mr. Sagen ak Adan, 2015

Quotes from one of the respondents above illustrates the current livelihood that is so much different from their previous livelihood and routine. The community of BRS have moved and stay at their new resettlement for more than one year. However, the villagers there are still facing various challenges due to the disrupted livelihood strategies.

Figure 4.3 displays the percentage of main challenges encountered by respondents after they moved to their new resettlement. Generally, more than half of the respondents are struggling to seek for new employment. The communities in BRS are facing difficulties to get new employment due to lack of skills and experience in other off-farm jobs.

Limited natural resources was noted as the second highest challenge, with 27.5 per cent, to survive in their new resettlement. Based on the finding from in-depth interview, inadequate access to land (natural resource) and difficulties to seek for new employment is interrelated. Formerly, the communities of BRS were full time farmers and their income sources were mostly generated from agriculture products. Hence, the communities were
incapable adapting to the new environment where off-farm job is believed to be more promising.

![Figure 4.3](image)

**Figure 4.3** Challenges faced by the BRS community

Although the DOA had proposed numerous agriculture projects such as rubber mini estate projects, poultry, rearing and aquaculture projects which aims to provide additional income to the households, respondents expressed that those projects were more of a dream than reality.

Challenging in identify the land ownership were recorded 5 per cent (Figure 4.3). Land ownership is still unclear for some of the villagers because of the poor communication with related agencies, where else transportation ranked as the least problem faced by the locals because the new resettlement is located nearer to schools and town.
### 4.4 Land Utilization Patterns

This section elaborates the characteristics of selected land utilization patterns including the type of crops adopt on their new land in conjunction with respondents’ point of view on factors that influenced them to implement such patterns. This section also examines the typical practices of agricultural activities based on respondents’ experiences.

Three acres of land was given as a compensation to each of the household in BRS. However, the size of compensated land is considered insufficient for traditional household farming and unable to sustain their livelihood especially to those solely rely on agriculture. To determine the viability of land utilization patterns for traditional farming system in BRS, three main land utilization patterns were proposed by the respondents in the focus group discussion. From there on, a cost-benefit analysis (CBA) was developed to determine the viability of the three land utilization patterns. Table 4.2 displays three main land utilization patterns to be executed on the compensated land.

Comparing to the aforementioned agricultural activities in Section 4.2, paddy and rubber were among the main crops cultivated by them, on the other hand, none of the respondents suggested to cultivate either one of these crops on their new land. Even though paddy is very important to the local community, especially to fulfill their culture and customs, its production was only mainly for self-consumption. The increasing tendency to produce cash crops especially in desperate situation has led to a decrease importance of paddy cultivation in relation to other crops. The local communities are unable to grow paddy on their compensated land due to limited natural resources. Consequently, the farmers only participated in cultivating cash crop that they are familiar with, in this case pepper.
cultivation. Another main crop that did not make into the list of land utilization is rubber. The respondents claimed that, the long period of at least five years to mature and ready to be tapped has forced them to forgo the crops although it was cultivated by them at a large scale in their previous villages. They added that pressure circumstance to earn money for living constrains them to adopt this crop on their new land.

Table 4.1 shows that most of the respondents 58 per cent are intended to implement Pattern B on their land, followed by 37 per cent planned to adopt Pattern A and the remaining 5 per cent would implement Pattern C on their compensated land.

<table>
<thead>
<tr>
<th>Category</th>
<th>Pattern</th>
<th>Land Utilization pattern</th>
<th>Products</th>
<th>Scale of operation (acre)</th>
<th>No. of Respondent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mono-crop</td>
<td>A</td>
<td>Pepper garden (450 vines)</td>
<td>Pepper</td>
<td>3</td>
<td>37</td>
</tr>
<tr>
<td>Mixed-garden</td>
<td>B</td>
<td>Pepper (230 vines), Maize (10,000 cobs)</td>
<td>Pepper</td>
<td>1.5</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Maize</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Pepper (230 vines), Banana (900 trees)</td>
<td>Pepper</td>
<td>1.5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Banana</td>
<td>1.5</td>
<td></td>
</tr>
</tbody>
</table>

Pattern B is a mixed-garden comprising of 230 vines in 1.5 acres and maize garden of approximately 10,000 cobs estimated by the respondents. Pepper farming is widely
proposed in the study site. From the interviews, the settlers cultivate pepper intensively, even before they were relocated to the new resettlement. The key driver affecting the decision to cultivate pepper is due to their vast experience and skills in pepper plants. The communities added that the pepper berries can be harvested three years after planted and it lasts for an average of ten years. However, the community of BRS was only started planting the pepper for one year from date. As such, the communities have to seek for alternative to generate income, and maize, according to the respondents is very ideal to complement with other cash crops. With an area of 1.5 acres, the farmers can roughly cultivate up to 10,000 cobs of maize. Based on respondents’ experience, maize crop is easy to cultivate. The cultivation of maize requires very little inputs for instance low application of fertilizers and less manpower is needed. Furthermore, with plenty of rainfall in Malaysia as well as suitable temperature has driven the respondents to grow maize on their land. Also, shorter period of maturity makes this crop as the most suitable complemented crop.

Other land utilization patterns suggested by the respondents is a mixed farming system between pepper and banana. However, only 5 per cent of all respondents recommended this pattern (Table 4.1) partly because the respondents are interested in gaining experience in other agricultural activity. In addition, they choose to engage in this farming system due to positive encouragement from their children as well as the awareness of high returns from banana cultivation. However, for some respondents, they were reluctant to participate in this pattern mainly because of their lack of experiences and guidance in banana cultivation. Limited access to land restricted them to involve in the new the agriculture which may or may not generate their income.
Thirty seven per cent of the respondents proposed to adopt monoculture system that is Pattern A on their new land. Previously, it is common for them to practice monoculture, namely pepper because they owed more than one plot of land. Based on respondents’ point of view, pepper cultivation in a monoculture system is easier to manage because they only focus to one particular crops. As claimed by the respondents, pepper is highly prone to diseases. By concentrating only on one crop, the respondents can devote their extra concerns in terms of time, management, and manpower to manage the pepper production, thus generates more outcomes with higher quality of pepper. Current market price of pepper (MYR27/kg) is also a contributing factor that influencing the respondents focus on pepper monoculture.

4.4.1 Common Agricultural Practices

In order to estimate the economics value on different land utilization patterns, it is vital to identify the common practices of agricultural activity conducted by the settlers in BRS. Since pepper was found out to be the main cash crops among the three patterns of agriculture activities, the details on typical practices including the time spent on each task were gathered in order to proceed with the calculation.

**Land Preparation**

From the interviews, the respondents claimed that the most tedious stage in pepper cultivation is the initiation stage which occurs during the first year of planting. Preparatory works that are normally performed at this stage are listed in Table 4.2.
Table 4.2 Preparatory works during initiation stage of pepper cultivation

<table>
<thead>
<tr>
<th>Preparatory Work</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felling and burning of land</td>
<td>One month assuming the weather is good</td>
</tr>
<tr>
<td>Ploughing and harrowing</td>
<td>Two months to be completed</td>
</tr>
<tr>
<td>Lining and mounding the soil</td>
<td>The soil is mounded approximately 20 cm high and 50 cm wide at the base support pole. Right after the farmers mounded the soil, dolomite will be applied on each mound.</td>
</tr>
<tr>
<td>Erecting post and planting</td>
<td>The number of days for erecting the support post and planting depend on the number of vines. For one ha of land, the local farmers normally cultivate 400 number of vines which is often performed in two weeks. For estimated calculation, the respondents stated that the amount of days for erecting post and planting on the new land is about the same as before because currently, they have plenty time to focus on agricultural activities.</td>
</tr>
<tr>
<td>Fern gathering and shading</td>
<td>Newly planted cuttings must be shaded immediately as they are very sensitive to moisture stress and sun scorching. Lallang leaves (Fern fronds) is usually used by the local farmers to provide shade.</td>
</tr>
</tbody>
</table>

Application of Fertilizer

The common fertilizer used for pepper cultivation is Dolomite. Dolomite at the amount of one kg is then broadcasted in each mound and left for three weeks. The application of Dolomite takes two to three weeks before planting. The application of NPK is conducted throughout the year until 19th months of planting (570 days). According to the respondent,
this task required more than two workers for one hectare of plantation hence, the application of fertilizer consumed roughly three months of labor days in one ha of land for the first year, followed by 45 days (half from first year) in consecutive years. It is advisable to apply more fertilizer after the first year of planting to ensure the berries the quality of growing berries. It seems that the minimal number of work days for fertilizing is attributed to limited amount of fertilizers and to avoid fertilizer shortage.

**Weeding**

Weed control is applied in circular motion around the pepper vine. Commonly, the farmers in BRS weed their pepper vines within a month period and this time taken becomes shorter (half of month period) in the following year to avoid the pepper berries from being too much expose to herbicides application.

**Vine Pruning**

For young pepper plants, pruning is one of the essential steps in order to eliminate unwanted shoots and branches which might affect the growth of pepper. The farmers in BRS usually prune their young pepper plant after the sixth month of plantation within a month per ha. This task continues at the 12th month of the plantation whereby by the vine is expected to reach almost half height of the post. Together with pruning, the farmers start to tie the node in order to train the pepper vine to climb the living support. Overall, the work require at least 60 days of the initiation year for pruning. In the second year, farmers will double their work day for pruning because the pepper vines is almost ready for harvesting.
**Flower Picking**

In pepper cultivation and based on Pepper Cultivation Manual, excessive flowers that grow on the pepper vine need to be plucked. The reduction in the number is to ensure better quality of pepper berries. However, the BRS farmers do not practice this, and they assume more flowers can lead to more pepper berries. As a consequence, the quality of berries is poor and command for lower market price. This task normally take place during the initiation stage when the pepper shoots reach the top of the support and it usually takes a week for a 450 vines of pepper.

**Harvesting**

Based on findings, pepper vines usually mature in the third year after planting. Pepper is normally harvested from April until June and it requires about 30 days to completely harvesting the whole 450 pepper vines. Local farmers classify harvesting process into three stages: The first stage is the maturity stage where the farmers only harvest matured peppers and the immatured peppers are left to ripe. The second stage is selection stage where the farmers will select the pepper berries that are in good condition. Lastly, the final harvest stage where all peppers vines are completely harvested. The fruit spikes are then threshed using manual method. As soon as pepper is harvested, the berries then will sun dried on mats for about four to five days depending on weather condition. It is common for the farmers to spread pepper berries in thin layer and turn them regularly to make sure they are dried evenly.
Besides pepper, maize is also identified as a part cash crop in the land utilization pattern. It is commonly cultivated in small scale, and thus, less production input and labor are required. The respondents suggested maize garden on 1.5 acres of land, which is estimated approximately 10,000 cobs of maize will be cultivated. At the initiation stage, land is cleared including cutting the grass and installing water systems for maize cultivation. The hole for maize is also plotted according to straight line and maize seed is ready to plant. For 10,000 cobs of maize, roughly 6 kg of seeds are needed. Harvesting period of maize is approximately 65 to 70 days after planting (once in every two months period). Fertilizer will be applied as soon as the seed is planted. NPK (15:15:15) and urea fertilizer are the common fertilizers utilized by the farmers. The amount of NPK for 10,000 cobs of maize is estimated at 120 kg per application; meanwhile urea fertilizer requires at least 240 kg per application. Even though maize can be harvested more than few times in a year, the application of those fertilizer is only once in a year. This is due to the fact that fertilizers used are very expensive and they difficulties to apply for fertilizer subsidies. Herbicides (Atrazine) was also mentioned by the respondents to attain better quality or grade of the maize. With approximately four kg of herbicides application, the work required is predicted to take four days during the first year of cultivation and two days for consecutive year. The farmers have predicted these days of labor because the pepper cultivation is almost ready to be harvested. Thus, they have to focus more on managing the pepper cultivation.

Based on interview sessions, respondents that choosing banana as their substitute crop does not have any experience in banana farming. Hence, the calculation of banana farming is based on DOA projection for 900 trees in 1.5 acres of land.
4.5 Cost and Benefits Analysis (CBA)

This section discusses the viability of the three land utilization patterns proposed by the respondents by employing the CBA. The estimation of cost and benefit is carried out using Microsoft Excel (refer to Appendix III and IV). The evaluation of the cost and benefit for each patterns are based on to respondents’ experiences on how the villagers normally conducted their agriculture activities and the wage that they willing to pay to the workers.

Table 4.3 Fixed parameters to estimate cost and benefits of land use patterns

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency rate</td>
<td>Using Malaysian Ringgit, MYR</td>
</tr>
<tr>
<td>Wage rate</td>
<td>MYR 12/day</td>
</tr>
<tr>
<td>Discount rate</td>
<td>10%/year</td>
</tr>
</tbody>
</table>

Table 4.3 denotes the fixed parameters used to calculate the estimation cost and benefit of each pattern. The respondents expressed that they are willing to pay wage of MYR12 per day to their workers. Ten per cent of discount rate is used to estimate the present value of cash flow in order to evaluate whether investments or projects are worth pursuing. Table 4.4 summarizes the cost and benefit analysis for three selected land utilization patterns which employ 10 per cent of interest rate and a period of ten years for one cycle.
4.5.1 Results Based on DOA Projection

Net present value (NPV) shows in Table 4.4 are calculated based on DOA estimation displayed in Appendix III.

<table>
<thead>
<tr>
<th>Profitability indicators</th>
<th>Value (10% Discount Rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Net Present Value (NPV) in RM</td>
<td>600,471.63</td>
</tr>
<tr>
<td>Benefit/Cost Ratio (BCR)</td>
<td>3.99</td>
</tr>
<tr>
<td>Internal Rate Return (IRR) in %</td>
<td>90</td>
</tr>
<tr>
<td>Payback period</td>
<td>3</td>
</tr>
</tbody>
</table>

Cost of materials and labour are calculated and analyzed using Microsoft Excel software according to the formula stated in Section 3.6, Section 3.7, and Section 3.8. Based on the results in Table 4.4, all of the selected land utilization by the respondents following the parameter tabulated in Table 4.3, indicating that the three projects are profitable and worth pursuing. With an estimated of RM200,539.10 for total present value cost (TPVC) of Pattern A, the settlers are expected to gain benefit with the total amount of RM801,010.73 of total present value of benefit (TPVB). By the third year of initiation of this pattern on their land, the settlers are probably to receive the payback with the total of RM22,401. Similarly, settlers are expected to gain RM684,666.90 TPVB when adopting Pattern B with the TPVC of RM150,675.91. With 4.54 BCR, this pattern is expected to return the payment within the third year with an estimation RM47,402 Pattern C also predicted to be worth for the settlers of BRS to be adopted on the compensated land. In Table 4.4,
Pattern C shows the highest NPV value comparing to other patterns, making it the most viable pattern to be conducted by the BRS. With an estimation of RM185,419 of TPVC, the settlers can gain RM801,872.81 TPVB and the payback period on the third year from agricultural establishment.

However, this result seems to be over projected considering that the farmers in BRS might conducting the agriculture activity differently.

4.5.2 Results Based on Respondents’ Experience

As tabulated in Table 4.5, the result of the profitability assessment based on respondents’ method to conduct their agriculture indicates only Pattern B and C are positive. Hence, both Pattern B and C are worth for the local communities to adopt on their new land.

<table>
<thead>
<tr>
<th>Profitability indicators</th>
<th>Value (10% Discount Rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Net Present Value (NPV) in RM</td>
<td>-2,124.92</td>
</tr>
<tr>
<td>Benefit/Cost Ratio (BCR)</td>
<td>0.97</td>
</tr>
<tr>
<td>Internal Rate Return (IRR) in %</td>
<td>9</td>
</tr>
<tr>
<td>Payback period</td>
<td>10</td>
</tr>
</tbody>
</table>
Pattern C shows a combination of pepper crops and banana farming. Given the positive value in NPV, this activity is therefore worthwhile to be undertaken. However, the farmers expressed this farming pattern is not possible carried out immediately due to their lack of experience in handling the banana farming. According to Husain and William (2011), banana farming requires a complicated management and full attention because of high tendency that the banana can easily be infected by diseases. Likewise, the viability of Pattern B (a mixed activity between pepper and maize) is expected to be a profitable project for the villagers. As shows in Table 4.1, this pattern shows the highest choice in terms of land utilization patterns among the respondents. With a 10 per cent discount rate, the farmers are expected to receive RM79,825.67 in total for a 10 years period with total production cost of RM57,317.24. The positive NPV suggests that this farming activity should be recommended to BRS settlers for the entire period.

Although both Pattern B and C resulted in positive outcome, Pattern B has higher NPV value compare to Pattern C although Pattern C is estimated to return the payback in the second year of the initiation of works. This is because the payback period method has some key weakness that the NPV method does not. The NPV method evaluates a capital project in terms of its financial return over a specific time period, whereas the payback method is concerned with the time that will elapse before a project repays the company’s initial investment. Unlike the NPV method, the payback method fails to account for the time value of money or project risk, but rather assumes all financial aspects of a project will progress as planned. In addition, the payback method fails to consider cash flow after the payback period. Hence, Pattern B is the most viable land utilization pattern to be adopted by the settlers of BRS on their three acres of land.
In comparison, pepper that is cultivated in a monoculture system yeild a negative NPV value thus indicated that this pattern is not profitable. Based on the calculation in Appendix IV, the total production cost in three acres of land over the period of 10 years is RM122,180. At a discount rate of 10 per cent, the net present value of production cost is predicted to be RM76,809.08 which is higher than the net present value for total revenue over 10 years period (RM74,684.16). If the price of pepper is constant at RM27/kg, the NPV of pattern using 10 per cent discount rate will be -RM2,124.92, BCR ratio is 0.97 and IRR is 9%. With reference to the decision criteria tabulated in Table 3.2, this project does not fulfill any of those conditions. The NPV value is negative, BCR ratio is less than one and IRR for this project is smaller than the discount rate.

The low productivity of pepper can be contributed by poor management of farm. Based on data gathered, the farmers in BRS normally plant about 400 vines of pepper in one hectare of land and they are expected to plant the same amount of pepper vines on their new land, which is equivalent to 450 vines in three acres of land. On the other hand, DOA cost and benefit estimation indicate that one hectare of land can accommodate a total of 2000 vines of pepper, with roughly 2.6 kg of pepper berries produced per vine for every year. Even though the end result is much lower compared to the estimated given by DOA, the villagers still able to survive in their previous livelihood because they have other sources of income from other crops planted at different plot of land owned by them.

Even though the outcomes from Pattern B and C show positive result, some of the respondents were reluctant to cultivate maize and banana in a larger scale. Based on their observations, fruits and vegetable cultivation has always been as a secondary activity to complement their household income. There are many factors which contributed to the
reason why the farmers at BRS were reluctant to plant fruit trees. Firstly, they claimed that planting fruit trees is labor intensive. This is further supported by the fact that the agriculture sector is declining. Secondly is the lack of support from the related agencies in terms of training and management of fruit trees. As a result, the growth of this industry has been unorganized. Lastly, the difficulties in marketing their products has also contributed to their unwillingness to participate in big scale of fruit farming.

4.6 Implications of Resettlement on BRS Community

At the early stage, most of the settlers at BRS experienced various kind of shortcomings and this can be particularly seen from them being unable to live a better and sustainable livelihood. Relocating them to BRS from their earlier and natural environment has caused numerous interferences and disturbances especially in terms of their socio-economic activities, mainly due to the loss in their common properties and abundant resources and also the wanton destruction to their social environment.

All of the interviewed household heads revealed that they are highly dependent on traditional agriculture as their source of household income. Even though they were compensated with three acres of land, they are still unable to practice any farming activities compared to what they have cultivated in their previous settlement. At the time when this study was conducted, the recent increase in pepper price does not guarantee higher return to the local communities in BRS. Rosli et al. (2013) pointed out that majority of the pepper farmers in Sarawak are small scale farmers. Generally, for a small size farm,
the production cost is and therefore generates a lower profit. This is because small farm size does not fully utilized the whole space of land compared to larger farms (Rosli et.al, 2013).

Besides that, the size of land available at BRS is not economical even to plant a particular cash crop on it. Based on findings, 1.5 acres of land can only be planted with approximately 230 pepper vines using traditional farming method and in this case, the farmers required financial supports to buy inputs such as fertilizers, herbicides, and pesticides among other things because the return is not that high. Rahim, et.al (2012) highlighted that farmers holding that owned 1,868 vines of pepper can be totally independent of government subsidies in pepper cultivation. Rahim, et.al (2012) also concluded that larger farm sizes could earn higher income and rely less on government subsidies.

The farming system either monoculture or polyculture adopted on the small size of land is also debatable. By referring to study by Hamid and Mansur (1997), farmers who cultivate pepper as a main cash crop in the farm are more efficient because they put more effort to the main crop compared with other crops. Diversity of crops in farm affects efficiency since land is allocated for too many crops, economies of scale cannot be exploited, and inputs are diverted to other crops (Hamid and Mansur, 1997). Moreover, the time required to harvest the pepper trees and the fluctuation in price of pepper make life to be even harder for the people of BRS. Traditional farming system on three acres of land allocated to them does not provide the household with adequate income to sustain
their livelihood. A strong visible disappointments expressed by one of the respondents illustrates the general frustrations upon the promises of the State government to remedy the situations. He said:

So far, none of the promises stated by the relevant agencies are fulfilled. For instance, they are willing to subsidies us farmers with 200 poles of belian poles for pepper plantation, however until now we only received about 160 poles and we have to search for other non-belian posts to complete our ideal farming capacity for pepper. The government often mention big amount of money for compensation, but we cannot really see the benefit of such compensation. Instead of providing us with the materials, we prefer to be compensated with cash because we know how to look for cheaper materials that can last longer.

Mr. Sakeh ak Rawon (2015)

4.7 Conclusion

In conclusion, this chapter revealed that the local communities of BRS were highly depended on agricultural works as income source to sustain their living. Also, the finding shows that the respondents were cultivate more than two types on their previous land to generate income from agricultural products. Three main land utilization patterns were suggested by respondents to be adopted on the land in BRS compensated to them. Pattern B (pepper and maize) was indicated the most viable pattern to be conducted on three acres of land due to the factor of agricultural background of managing pepper and maize plant.
CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This section concludes the results from data analysis and to respond the goal and objectives of the study based on findings on the viability of traditional farming system among the local household communities at BRS. Recommendations are made in order to improve the productivity of the farming systems on the three acres of land and the possibility of linkages where feasible among the responsible related relevant agencies.

5.2 Conclusions

Challenges confronted by the local communities in BRS are similar to what had happened in other resettlement schemes due to the construction of dam in Sarawak. The planners either failed to address the constraints adequately or avoided the dispute until it was too late to implement a good strategy. In economic issues, the local communities highlighted that the scarcity of land available for agriculture activity is affecting their livelihood strategies and resulted in loss of main income source and unemployment. However, due to limited skills suitable for other off-farm jobs, and the desperate condition to earn money
elsewhere for a living, the local communities has no other choice but to proceed with their traditional agriculture knowledge on the compensated land.

The purpose of the study was to assess the viability of traditional farming system among the BRS community that is limited to three acres per household. Several objectives were outlined in order to achieve the aim of the study.

The first objective is to investigate the previous livelihood strategies in relation to the traditional farming system among the local communities in BRS. Based on finding, the settlers of BRS relied on agricultural products as their main income sources. It is also indicated that the settlers of BRS were adopted more than two types of crops in their previous land to generate sufficient income for living.

Second objective is to determine the land utilization pattern for traditional farming proposed by the community of BRS. It is found out that three main land utilization patterns were proposed by the respondents as listed below:

Pattern A : Pepper monoculture of 450 vines of pepper plant on three acres of land

Pattern B : Mixed plant of 230 vines of pepper on 1.5 acres of land and 10,000 cobs of maize plants on 1.5 acres of land

Pattern C : Mixed plant of 230 vines of pepper on 1.5 acres and 900 banana trees on 1.5 acres of land.
The third objective of the study is to estimate the cost and benefit of the land utilization pattern according to local communities in regard to the traditional household farming system. Based on the finding of CBA conducted on the traditional farming system proposed by the BRS settlers, it was found out that the pepper and maize garden (Pattern B) was determined as the best choice for BRS community to generate their income for the time being. Pepper was highlighted as the main choice of crops to be planted on the compensated land due to their high experiences and skills in pepper management. As a result, the villagers are willing to take the risk by implementing pepper cultivation on their new land. However, there is the difficulty to generate income solely from pepper productivity (monoculture system) because pepper cultivation require at least three years to mature and ready for harvesting. From findings, the limited size of land has forced the farmers to adopt cash crops that require shorter period of time for harvest. Therefore, pattern B is the most suitable traditional farming regime for the local communities in BRS. Table 5.1 has concluded that Pattern B is fulfilled the decision criteria using cost and benefit indicators.

<table>
<thead>
<tr>
<th>Pattern B</th>
<th>Parameter</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>22,508.43</td>
<td>NPV</td>
<td>Positive value</td>
</tr>
<tr>
<td>1.39</td>
<td>BCR</td>
<td>&gt; 1.0</td>
</tr>
<tr>
<td>28</td>
<td>IRR</td>
<td>&gt; Discount rate</td>
</tr>
<tr>
<td>6</td>
<td>Payback Period</td>
<td>&lt; Pattern A</td>
</tr>
</tbody>
</table>

Maize garden as a substitute crops because it is an easy crop to cultivate. The production of maize require little inputs such as low application of fertilizers & manpower needed. Moreover, with abundant amount of rainfall and suitable temperature for maize to mature
has become the key drivers to plant maize crop on their compensated land. Shorter period of harvesting the maize product also makes this crop as the most suitable crops substitution.

Table 5.2  Criteria of Pattern A

<table>
<thead>
<tr>
<th>Pattern A</th>
<th>Parameter</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2,201.70</td>
<td>NPV</td>
<td>Negative value</td>
</tr>
<tr>
<td>0.97</td>
<td>BCR</td>
<td>&lt; 1.0</td>
</tr>
<tr>
<td>9</td>
<td>IRR</td>
<td>&lt; Discount Rate</td>
</tr>
<tr>
<td>10</td>
<td>Payback Period</td>
<td>Too long</td>
</tr>
</tbody>
</table>

Pattern A was indicted not viable to be adopted on the three acres of land. It is found out that through CBA, the NPV is negative, BCR is less than one, IRR is less than the discount rate of 10 per cent, and the payback period is estimated more than 10 years. Hence, this pattern is indicated not viable for the settlers of BRS.

Table 5.3  Criteria of Pattern C

<table>
<thead>
<tr>
<th>Pattern C</th>
<th>Parameter</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>16,634.58</td>
<td>NPV</td>
<td>Positive value</td>
</tr>
<tr>
<td>1.23</td>
<td>BCR</td>
<td>&gt; 1.0</td>
</tr>
<tr>
<td>662</td>
<td>IRR</td>
<td>&gt; Discount rate</td>
</tr>
<tr>
<td>2</td>
<td>Payback Period</td>
<td>&lt; Pattern A, B</td>
</tr>
</tbody>
</table>

Criteria of Pattern C tabulated in Table 5.3 indicated that the pattern is viable for the settles of BRS to be adopted on the three acres of land. The respondents who willing to
adopt this pattern Nonetheless, little number of respondents were dare to risk their three acres of land by cultivating fruit trees as their income source. Lack of financial support and experience slow down the respondents to adopt this pattern on their land.

5.3 Recommendations

This section deliberates recommendations based on findings and discussion in Chapter 4. Couple with this, this section also provides recommendations for related agencies in ways how to improve the livelihood strategies of the affected communities due to their involuntary resettlement.

5.3.1 Education of Agriculture Technology Practices

Farmers in the affected area are mostly cultivating their crops using traditional method. Based on the findings, it appears that this method is not only costly but they generate lower outcomes to the farmers. For small size of land, intensive agriculture practices is required in order to fully utilize the whole land area. Intensive training should be conducted to the local farmers with the aim to educate the farmers with the latest technology that can contribute to higher yield of product. The training should be often in order to enhance their knowledge in managing, maintaining, diversifying and intensifying their crops production. One of the fundamental trainings that should be included is the
knowledge to identify and monitor the pest occurrences since this problem is the major problem which affects their yield.

5.3.2 Improvement of Government Assistance

It will be a major problem for the local communities to cope with the continuously increase in the price of consumer goods and other necessities. Thus, with government assistance in providing subsidies for fertilizers, pesticides, and herbicides it can ease the burden of the farmers greatly. Besides that, government can help the farmers by facilitating the marketing of their farm produces.

5.3.3 Upgrading Capabilities of Agriculture Production for Premium Markets

The agricultural sector in Sarawak is expected to gear towards the production of export commodities. Therefore, the related agencies should take the initiative on monitoring the agricultural outcomes produced by the local farmers in BRS. The local farmers will not only beneficial in terms of guidance and support for agriculture activities but also improving their income source.
5.4 Future Study

The resettlement program should have been properly revised and improved after the feedback from the indigenous communities. There is also a necessity to undertake a follow-up study with respect to the relationship between the viability of selected crops with the market trends particularly in Sarawak. Thus, this relationship between viability of cash crops and market trends implies greater profit among BRS community in handling land utilization method as well as to secure their livelihood strategies at new resettlement.
BIBLIOGRAPHY


APPENDIX I  INTERVIEW SCHEDULE

No. Rujukan Responden: ________________

DAYA MAJU PERTANIAN ISI RUMAH SECARA TRADITIONAL DI KALANGAN PENDUDUK PENEMPATAN SEMULA BENGOH

TARIKH TEMU BUAL : __________________________
NAMA RESPONDEN : __________________________
NAMA KAMPUNG : ____________________________
KAD PENGENALAN : __________________________

KANDUNGAN BORANG SOAL SELIDIK

Borang soal selidik ini terbahagi kepada bahagian-bahagian seperti berikut

A. PERSEPSI AHLI ISI RUMAH (AIR) TENTANG PERPINDAHAN
B. MAKLUMAT AKTIVITI PERTANIAN SEBELUM BERPINDAH
C. PERANCANGAN PEMBANGUNAN BAGI TANAH PAMPASAN SELUAS 3 EKAR
Bahagian A:

Apakah persepsi selepas berpindah dari penempatan asal anda?

_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

Kekangan/Cabaran yang paling sukar dihadapi setelah berpindah ke penempatan baru:

- Peluang pekerjaan baru (new employment)
- Sumber semula jadi yang terhad (limited natural resources)
- Pengangkutan (transportation)
- Pemilikan tanah (land ownership)

Bahagian B: Maklumat Pertanian Sebelum BERPINDAH

Bahagian B bertujuan untuk menjawab objektif kajian yang pertama iaitu untuk mengenalpasti amalan atau cara pertanian yang biasa dilakukan sebelum berpindah ke penempatan semula yang baru Bengoh.

Sumber pendapatan utama sebelum berpindah:

- Hasil pertanian
- Gaji Bulanan (off-farm work)
- Penghantaran wang dari ahli keluarga

Tanaman utama (Rank the top 3)

<table>
<thead>
<tr>
<th>Tanaman</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Getah</td>
<td></td>
</tr>
<tr>
<td>Lada</td>
<td></td>
</tr>
<tr>
<td>Padi (bukit dan paya)</td>
<td></td>
</tr>
<tr>
<td>Koko</td>
<td></td>
</tr>
<tr>
<td>Buah – buahan</td>
<td></td>
</tr>
<tr>
<td>Kelapa sawit</td>
<td></td>
</tr>
<tr>
<td>Sayur-sayuran</td>
<td></td>
</tr>
</tbody>
</table>
Lain-lain (nyatakan)

Sebab tanaman (1,2,3) tersebut menjadi keutamaan

_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

BAHAGIAN C: PERANCANGAN PEMBANGUNAN BAGI TANAH PAMPASAN SELUAS 3 EKAR (DEVELOPMENT PLANNING ON 3 ACRES OF COMPENSATED LAND)

Sumber pendapatan selepas berpindah:

_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

Berdasarkan tanaman utama yang pernah dilakukan sebelum berpindah, adakah anda akan memilih untuk menanam tanaman tersebut di atas tanah pampasan sebanyak 3 ekar?

[ ] Ya
[ ] Tidak

1) Jika ya, nyatakan perancangan anda di atas tanah pampasan tersebut

_____________________________________________________________________________
_____________________________________________________________________________

Adakah anda akan melaksanakan tanaman tersebut mengikut cara-cara pertanian yang biasa anda lakukan?

_____________________________________________________________________________

2) Jika tidak, nyatakan sebab memilih tanaman lain dan cara-cara penanaman tanaman tersebut

_____________________________________________________________________________
## Appendix II  COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Hrs</th>
<th>Resource persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMD 6056/ CML6066</td>
<td>Submit one (1) title and your supervisor name of your research project to be the SLUSE-M Program Coordinator by <strong>2 Sept 2014 (Tuesday)</strong>. For those students who do not have their supervisor, one supervisor will be assigned to him/her by program coordinator. Once a Supervisor has been assigned to you, you are required to immediately start works in your research projects. Students are required to present the research proposal on <strong>26 October 2014 (Sunday)</strong>. Students are required to submit the progress report to their supervisor by <strong>19 Dec 2014 (Friday)</strong>. Students are required to submit their first draft final report to their supervisor for checking by <strong>30 Jan 2015 (Friday)</strong>. Supervisors are required to check and edit the first draft of final report by <strong>20 Feb 2015 (Friday)</strong>. Students are required to present their final draft for grading by supervisors and examiners by <strong>20 March 2015 (Friday)</strong>. Students are required to present their final findings/final presentation on <strong>29 March 2015 (Sunday)</strong>. Supervisors and examiners are required to return the marked dissertations to students by 3 April 2015 (Friday). Submission of hard bound dissertation is on <strong>8 May 2015 (Friday)</strong>.</td>
<td>ALL SLUSE resources persons</td>
<td></td>
</tr>
</tbody>
</table>
Appendix III

Economic Estimation of Land Utilization Based on DOA Projection
APPENDIX IV

ECONOMIC ESTIMATION OF LAND UTILIZATION BASED ON RESPONDENTS’ EXPERIENCE
Appendix V  Previous Seasonal Calendar of Farming Activities

<table>
<thead>
<tr>
<th>Month</th>
<th>Paddy</th>
<th>Pepper</th>
<th>Rubber</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3rd year – onwards</td>
<td>1st – 2nd year</td>
</tr>
<tr>
<td>January</td>
<td>Flowering</td>
<td>Rubber tapping</td>
<td>Fertilizer application</td>
</tr>
<tr>
<td>February</td>
<td>Ripening</td>
<td>Rubber tapping</td>
<td>Fertilizer application</td>
</tr>
<tr>
<td>March</td>
<td>Harvesting/processing and celebration</td>
<td>Pepper planting (Same plot as rice)</td>
<td>Rubber tapping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rubber tapping</td>
<td>Fertilizer application</td>
</tr>
<tr>
<td>April</td>
<td></td>
<td>Pepper ripens</td>
<td>Rubber tapping</td>
</tr>
<tr>
<td>May</td>
<td></td>
<td>Harvesting, processing and selling</td>
<td>Rubber tapping</td>
</tr>
<tr>
<td>June</td>
<td>Grass and trees clearing</td>
<td>Pesticides and herbicides applications</td>
<td>Rubber tapping</td>
</tr>
<tr>
<td>July</td>
<td>Grass and trees clearing, residues dry on the ground</td>
<td>Pesticides and herbicides applications</td>
<td>Rubber tapping</td>
</tr>
<tr>
<td>August</td>
<td>Slash and burn</td>
<td>Pesticides, herbicides and fertilizer applications</td>
<td>Rubber tapping</td>
</tr>
<tr>
<td>September</td>
<td>Remoulding</td>
<td>Spray pepper flower, fertilizer application</td>
<td>Rubber tapping</td>
</tr>
<tr>
<td>October</td>
<td>Weeding and herbicides application</td>
<td>Herbicides, fertilizer application</td>
<td>Rubber tapping</td>
</tr>
<tr>
<td>November</td>
<td>Fertilizer application</td>
<td>Fertilizer application</td>
<td>Rubber tapping</td>
</tr>
<tr>
<td>December</td>
<td>Weeding</td>
<td>Rubber tapping</td>
<td>Fertilizer applications</td>
</tr>
</tbody>
</table>