

**LIVELIHOOD STRATEGIES OF COASTAL FISHERMEN ON
PANGKOR ISLAND USING A MODIFIED LIVELIHOOD
STRATEGIES DETERMINANTS FRAMEWORK**

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**INSTITUTE FOR ADVANCED STUDIES
UNIVERSITY OF MALAYA
KUALA LUMPUR**

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ON PANGKOR ISLAND USING A MODIFIED
LIVELIHOOD STRATEGIES DETERMINANTS
FRAMEWORK**

HO SIEW NEO

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REQUIREMENTS FOR THE DEGREE OF DOCTOR OF
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ORIGINAL LITERARY WORK DECLARATION

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Title of Project Paper/Research Report/Dissertation/Thesis ("this Work"):

Livelihood Strategies of Coastal Fishermen on Pangkor Island Using Modified
Livelihood Strategies Determinant Framework

Field of Study: Sustainable Livelihood

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LIVELIHOOD STRATEGIES OF COASTAL FISHERMEN ON PANGKOR ISLAND USING A MODIFIED LIVELIHOOD STRATEGIES DETERMINANTS FRAMEWORK

ABSTRACT

Sustainable development of a nation involves efficient, appropriate and sustainable use of various resources. However, there is no single sustainable livelihood framework which can be generalized. Therefore, this study explores the factors affecting Pangkor Island coastal fishermen decision on choice of livelihood strategies. An exploratory sequential mixed method approach was applied whereby eight findings were gathered and reorganized into eight factors to be tested in quantitative phase. Livelihood Strategies Framework (LSF) was developed, treating the eight factors as independent variables and two livelihood strategies, i.e. livelihood intensification and livelihood diversification, as dependent variables. An open-ended interview questions were utilized as guided questions in qualitative data collection phase, while a survey questionnaire was employed in quantitative phase to gather necessary data. Quantitative data were validated using Exploratory Factor Analysis (EFA) and were analysed using Structural Equation Model (SEM) and Pearson correlation analysis. A total of 15 interviews were carried out in the qualitative phase while a total of 165 responses were gathered in the quantitative data collection phase. This study revealed two important findings: (1) education level, level of income versus expenses, trend of output, coping strategies adopted, risk, and fishermen view of sustainable income are significant factors affecting fishermen choice of livelihood intensification strategies, while (2) education level, level of income versus expenses, trend of output, and willingness to learn are significant factors affecting their choice of livelihood diversification strategies. These findings are useful for the authorities in the future planning for the social and economic welfare development of coastal fishermen in Malaysia and subsequently affects the Malaysia's fiscal planning.

STRATEGI SARA HIDUP NELAYAN PINGGIR PANTAI DI PULAU PANGKOR MENGGUNAKAN RANGKA KERJA STRATEGI SARA HIDUP TERUBAH SUAI

ABSTRAK

Pembangunan mampan bagi sebuah negara melibatkan penggunaan sumber yang cekap, sesuai (wajar) dan lestari. Walau bagaimanapun, tidak ada satu rangka kerja penghidupan mampan yang boleh digunakan secara umum. Oleh itu, kajian ini menerokai faktor yang mempengaruhi pemilihan strategi penghidupan nelayan pinggir laut Pulau Pangkor. Pendekatan kaedah campuran penerokaan berjujukan digunakan kajian ini, di mana lapan penemuan daripada fasa kualitatif dikumpulkan dan disusun semula, and dijadikan lapan faktor yang diuji dalam fasa kuantitatif. Rangka kerja yang dikenali sebagai Rangka Kerja Strategi Penghidupan (LSF) telah dihasilkan, menganggap lapan faktor tersebut sebagai pembolehubah bebas dan dua strategi penghidupan, iaitu intensifikasi dan mempelbagaian mata pencarian, sebagai pembolehubah bersandar. Soalan temu bual terbuka digunakan sebagai soalan panduan pada fasa pengumpulan data kualitatif, manakala soal selidik tinjauan digunakan semasa fasa kuantitatif untuk mengumpulkan data yang diperlukan. Data kuantitatif telah disahkan melalui Analisis Faktor Jelajahan (EFA) dan dianalisis menggunakan Model Persamaan Struktur (SEM) dan analisis Korelasi Pearson. Sejumlah 15 temu bual telah dijalankan pada fasa kualitatif manakala sejumlah 165 respon dikumpulkan pada fasa pengumpulan data kuantitatif. Dua penemuan penting telah diperolehi dalam kajian ini: (1) tahap pendidikan, tahap pendapatan berbanding perbelanjaan, trend (or arah aliran, trend is acceptable according to DBP) keluaran, strategi mengatasi masalah kewangan, risiko, dan pandangan nelayan tentang pendapatan yang mampan adalah faktor penting yang akan mempengaruhi keputusan nelayan semasa memilih strategi intensifikasi mata pencarian, sementara (2) tahap pendidikan, tahap pendapatan berbanding perbelanjaan, trend keluaran, dan kesanggupan untuk belajar adalah faktor penting mempengaruhi pilihan mereka dalam strategi mempelbagaian mata

pencarian. Penemuan ini adalah berguna kepada pihak berkuasa dalam perancangan pembangunan kebajikan sosial dan ekonomi nelayan pinggir laut di Malaysia pada masa hadapan, dan seterusnya mempengaruhi perancangan fiskal negara.

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LIST OF SYMBOLS AND ABBREVIATIONS

ACITS: Academic Computing and Instructional Technology Services

AGFI: Adjusted Goodness of Fit Index

AMOS: Analysis of a Moment Structures

BRIM: *Bantuan Rakyat 1 Malaysia*

CARE: Cooperative for Assistance and Relief Everywhere

CFA: Confirmatory Factor Analysis

CMIN: Chi-Square Value

DFID: Department for International Development

DOF: Department of Fisheries of Malaysia

EFA: Exploratory Factor Analysis

EPF: Employees Provident Fund

FAO: Food and Agriculture Organization

GDP: Gross Domestic Product

GFI: Goodness of Fit Index

GPS: Global Positioning System

GRT: Gross Register Tonnage

HLS: Household Livelihood Security

IDS: International Development Studies

LKIM: Fisheries Development Authority of Malaysia

LSDF: Livelihood Strategies Determinant Framework

NFI: Normed Fit Index

PMR: Penilaian Menengah Rendah

RMR: Root Mean Square Residual Index

RMSEA: Root Mean Square Error of Approximation

SDG: Sustainable Development Goals

SEM: Structural Equation Modelling

SPM: Sijil Pelajaran Malaysia

SPSS: Statistical Package for the Social Sciences

SRP: Sijil Rendah Pelajaran

TLI: Tucker Lewis Index

UN: United Nations

VIF: Variation Inflation Factor

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LIST OF APPENDICES

Appendix A: Questionnaire

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CHAPTER 1 INTRODUCTION

1.1 Motivation for the study

Livelihood strategies are contributed by a number of factors. These strategies if appropriately adopted and well implemented are known to have improved the level of livelihood outcomes (DFID, 1999). In other words, livelihood strategies available to a particular community have certain level of influence on livelihood outcomes of the said community.

To date, Pangkor Island is experiencing rapid development especially in the tourism industry. The Perak State government is keen on improving the living standard of the residents alongside with the development of the tourism industry. This can be seen when public facilities and public transportation are being developed to attract more tourists on to the island. At the same time, a few projects were also initiated on Pangkor Island to create more tourist attractions.

However, as what had happened in Penang, the local fishermen there raised their concerns on the possible effects of the planned project of SRS Consortium Sdn. Bhd. in developing a man-made island. The local fishermen mentioned that the said project will worsen their total fishing output, which has already been decreasing over the years, and they are not comfortable with the idea of relocating from comfortable village styled houses into small apartment units (Kim, 2016). Therefore, it is equally important for the state government of Perak to not only focus on the physical development of the island, but also on the social and economic welfare of the population as well. This is to ensure that their social and economic welfare is not being sidelined by the rapid physical development of the island. Therefore, in the future plan, the local authority will need to

look into the criteria which might encourage social and economic welfare development of the local community, especially the fishermen community.

In 2004, the total number of tourists to Pangkor Island was 471, 868 and by the year 2016 it had increased to 1,051,169; an annual increase of about 20% (Manjung Municipal Council, 2016). Following this statistic, the researcher believes that many opportunities will be created for the young generation and mix strategies must be applied by the fishermen in order to sustain their income. On top of that, based on past research in the same field, it showed that tourism had resulted in the mixed livelihood strategies, based on the ability and willingness of the coastal fishermen to cope with the changes and to take up the opportunities provided in the tourism industry (Fabinyi, 2010). Research done in Cape Verde (Africa) and Pulau Langkawi (Malaysia) both showed that the local community perceived tourism development as an advantage to the local economy. Positive effects mentioned in both researches included the advancement of infrastructure, more suitable job opportunities, increased family income, improved knowledge level of the local community, etc (Salleh, Othman, Idris, Shukor, Yussof, Omar, Halim & Samsudin, 2014; María, Julia, & Fernando, 2014). This study therefore, aims at investigating the livelihood strategies of the coastal fishermen through the establishment of relationship between mixed livelihood strategies and livelihood outcome, particularly sustainable income.

This research is based on the basic principles of DFID (Department for International Development) and IDS (International Development Studies) sustainable livelihood frameworks. The combination of the two frameworks are needed to study the Malaysian context for the following reasons:

- a. DFID Sustainable Livelihood Framework is a comprehensive framework of sustainable livelihood. The basic principle of DFID is not about moving people

from one form of employment to another, or from ‘own-account’ activity to another but to search for the best combination of activities to achieve the desired livelihood outcomes. In Malaysia, the government agencies are encouraging the rural community to develop through various programmes, such as the Rural Transformation Programme 2012 which was aimed at attracting more private investments to enhance economic activities of the rural community and to create more job opportunities so as to encourage the youngsters to return, live or work in rural areas. This programme implied that diversification of livelihood strategies is important as it creates more job opportunities and ultimately improves the sustainable livelihoods of the rural community.

- b. IDS Sustainable Livelihoods by Scoones (1998) on the other hand, encourages a portfolio of livelihood strategies, i.e. intensification of livelihood strategies, diversification of livelihood strategies and migration. This principle is in-line with the principle of DFID Sustainable Livelihoods Framework.

As the main motivation of this study is to look into the criteria which might affect the choice of livelihood strategies among the coastal fishermen, therefore, a combination of two frameworks is an important reference to initiate the livelihood strategies in the Malaysian context.

This research is also in line with the seventeen (17) Sustainable Development Goals (SDG) in September 2015, with aimed at transforming the world by year 2030 as shown in Figure 1.1 below.



Figure 1. 1: Sustainable Development Goals

(Source: United Nations Development Programme, 2016)

This shows that sustainable livelihood is not a mere theory, but rather it is the objectives or desired outcomes of everyone and every community in the world. As a member of United Nations (UN), it is therefore important for the Economic Planning Unit of Malaysia, to ensure that any development plans in the country is line with the SDG. This action will contribute to the process of transforming Malaysia from a developing country to a developed country. To date, according to Misran (2016) of the Economic Planning Unit, Malaysia has planned a few initiatives and initiated some through the Eleventh Malaysia Plan for the years 2016-2020 which includes the following:

- a. Enhancing inclusiveness towards an equitable society, which includes inclusivity, ensuring that all Malaysians benefit from economic growth, regardless of gender, ethnicity, socio-economic status or geographic location;

- b. Improving the wellbeing for all, which included healthy individuals and happy households, living in cohesive and united communities;
- c. Accelerating human capital development for an advanced nation, which includes the focus on cradle-to-grave talent development and lifelong learning to improved labour productivity, delivering a higher-skilled workforce, and creating a virtuous cycle of job creation, growth and social development
- d. Pursuing green growth for sustainability and resilience, which includes adopting green growth as a way of life which will ultimately lead to strengthening of food, water and energy security, lower environmental risks, and subsequently better well-being and quality of life.
- e. Strengthening infrastructure to support economic expansion, which includes ensuring that all Malaysians have access to basic amenities and be connected through comprehensive transportation system and high-speed internet. This will ultimately reduce the cost of production and improve the country's international competitiveness level.
- f. Re-engineering economic growth for greater prosperity, which includes ensuring quality growth, whereby all economic sectors should be moving towards more knowledge-intensive and high value-added activities with greater productivity.

These initiatives further emphasize the importance of livelihood strategies to the community's income level towards achieving the goal of the Eleventh Malaysia Plan and the SDGs, i.e. what will motivate the fishermen for example, to improve their level of income, or how ready are they in moving together with the country in terms of achieving sustainable income.

On top of that, these seventeen SDGs show that the range covered in sustainable development is too wide to be covered in one research. Therefore, the researcher has decided to focus on the eighth and tenth goals of SDG. The eighth SDG refers to

“promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all” (United Nations Development Programme, 2016), which focuses on (a) Promoting the development policies or frameworks which support decent job creation and sustainable income, (b) Creating sustainable per capita economic growth in the country – encourages intensification in the Malaysian context as fishing output is an important source of national income and (c) Achieving higher levels of economic growth through diversification – encourages diversification, not terminating current source of income. On the other hand, the tenth goal of SDG refers to “reduce inequality within and among countries” (United Nations Development Programme, 2016) aiming at (a) empowering and promoting social, economic and political inclusion for all, (b) ensure equal opportunity for all through elimination of discriminatory laws, and (c) adopting policies which allow the achievement of greater equality.

Therefore, the researcher is motivated to study the factors affecting the choice of livelihood intensification and diversification among the coastal fishermen, and how these choices are connected to the achievement of sustainable income. It is therefore believed that this research will contribute to the country’s future development or fiscal planning.

At the same time, according to the statistics generated by the International Labour Organization, 204 million were unemployed in year 2015 due to the slow growth of the global economy compared to the rapid expansion of the labour force. This phenomenon is taking place in Malaysia as well, whereby the rate of unemployment among Malaysian youth has reached 10.2% in year 2015 (United Nations Development Programme, 2016). Besides, the development of the tourism industry will have direct and indirect effect on the fishery industry, particularly on the level of productivity. An improper development of tourism industry will affect the habitat and reduce the volume of fish supply due to the growing demand (Majid & Subramaniam, 2017). This will result in an increase of unemployment rate in the fishing industry leading to a contraction of the fishery industry.

Even though the tourism industry will provide extensive job opportunities, it might not benefit the fishermen community for various reasons, such as a lack of skills and knowledge or resistance to change. These reasons vary from one community to another. Therefore, it is again important to know what might cause the coastal fishermen to intensify in their fishing activities, or to look for opportunity of diversifying, so as to protect the ecological system of Pangkor Island.

Lastly, based on DFID Sustainable Livelihood Framework, it is important for the researcher not to impose the same perspective of sustainable livelihoods on the studied community, as it could result in misinterpretation since different communities and individuals will have different perspectives on the concept of “sustainable” alone. Even if it is the same, the strategies they are applying now, their attitudes towards the changes that is happening, their willingness to adapt to the changes and even opportunities available to them might cause them to adopt different paces in moving towards the sustainable livelihoods’ outcome. Therefore, the researcher foresees the interesting outcome she is going to get, which might not be the same as the aim of UN SDG. If it is different, it will assist the policy maker in making the right decision of putting things back on track so to ensure the achievement of SDG.

1.2 Background

1.2.1 Malaysia’s Fishery Industry

The fishery industry in Malaysia, as it is in many other countries, plays a significant role in the country’s development as it contributes to a significant portion of the Gross Domestic Product (GDP). In 2013 alone, the landing of capture fisheries in Malaysia has contributed RM8,335.92 million to the country’s economy (Department of Fisheries of Malaysia, 2016) of which 79% were contributed by the coastal fishery

industry. In Perak, where Pangkor Island is situated, it has landed 307,186 tonnes (20.7% of total capture fisheries landing) worth RM1,777.68 million, which made Perak the biggest contributor to the fishery industry of Malaysia (Department of Fisheries of Malaysia, 2016). Total amount of landing of capture fisheries continue to increase over the years. The latest information reported by Department of Fisheries of Malaysia (2016) showed that the fishery industry, mainly captured fisheries, contributed to RM10,176.26 million to the Malaysian economy, an increase of 9.16% in value as compared to year 2015, of which 82.7% were contributed by the coastal fishery sector and 21.8% of this coastal output were contributed by Perak alone.

Besides its contribution to Malaysia's GDP, the fishery industry is equally important to Malaysia as (i) fishery output is one of the main source of protein for Malaysians (based on the Malaysian food culture), (ii) fishery output contributes to Malaysian export to Japan, Taiwan, Singapore, (iii) fishery industry provides job opportunities to fishermen, seafood processing workers, fishery related researchers, fishmonger, etc, (iv) it has domino effects on other industry, such as sardine processing factories, boat manufacturers, fishing equipment manufacturers, etc.

One sector of fishing industry, marine fisheries itself can be categorized into four zones, namely Zone A (0-5 nautical miles from shore), Zone B (5-12 nautical miles), Zone C (12-30 nautical miles) and Zone C2 (30-200 nautical miles). Zone A is reserved solely for small scale fishermen, Zone B for owner-operated commercial fishing vessels of less than 40GRT, Zone C for commercial fishing vessels of more than 40GRT and Zone C2 for deep-sea fishing vessels of 70GRT and above (FAO, 2001). This research will be focusing on fishermen who carry out their activities on the coastal area, i.e. Zone A, B and C as the majority of the local fishermen are operating in these zones. (Figure 1.2)



Figure 1. 2: Fishing Zones

(Source: Department of Fishery, 2015)

There are a few organizations and ministries working hand in hand in Malaysia to support the fishery industry. These organizations include the State Governments, “*Jabatan Perikanan Malaysia*” (Department of Fisheries of Malaysia, thereafter referred to as ‘DOF’), “*Lembaga Kemajuan Ikan Malaysia*” (Fisheries Development Authority of Malaysia, thereafter referred to as ‘LKIM’) and Fishermen’s Associations. DOF’s main duty is to work on the development and management of the fisheries industry in the country. DOF’s fishermen related roles include providing training, introducing new technology, introducing fishery tools and methods as well as research and development. On the other hand, LKIM aims to increase the standard of living of the small-scale fishing communities (the target community of this research) which include providing them with the right infrastructure for fish landing, marketing of fishery products, fishermen licence and licence for import and export. LKIM’s main duty is to manage the fishery output, all kinds of subsidies (related to fishermen, i.e. diesel, petrol, etc), fishermen’s monthly

allowance and vessel insurance. Both DOF and LKIM are the bodies under the governance of Ministry of Agriculture Malaysia. “Persatuan Nelayan” (Fishermen’s Association) on the other hand, is entrusted to assist in managing the vessels, renewal of license for both fishermen and vessels, provide training for the fishermen, and most importantly, act as the middlemen between LKIM and the area fishermen. In summary, the body which work closely on a daily basis with the fishermen are the local LKIM and Fishermen’s Association.

The Coastal Fishery Sector

As mentioned, coastal fishery includes fishing activities done within Zone A, B and C as per Figure 1.2 above. This sector is the major contributors to the fishing output of Malaysia as shown in Table 1.1 below. However, it is important to note that the coastal fishery sector has been heavily exploited and over-saturated beyond sustainable levels in most areas of Peninsular Malaysia as compared to deep-sea fishery sector which still has room for development (Busing, 2001; Food and Agriculture Organization, 2001).

Fishing gear allowed in the coastal area includes drift and gill net (*pukat hanyut*), anchovy purse seine (*pukat jerut bilis*), fish purse seine (*pukat jerut ikan*), hook and line (*pancing*), portable trap (*bubu*), trawl net (*pukat tunda*), lift net (*pukat tangguk*), bag net (*pukat bakul*), scoop net (*pukat surung*) and barrier net (*pukat rentang*). In year 2014, drift and gill net and fish purse seine have contributed 332,888 tons and 251,057 tons respectively to the total of about 1,200,000 tons of coastal fish production, i.e. 48%, making them the major contributors to the production in this area in Figure 1.3 below.

MALAYSIA
PENDARATAN MENGIKUT PERALATAN MENANGKAP IKAN, (2010 -2014)
Landing By Gear Group, (2010 – 2014)

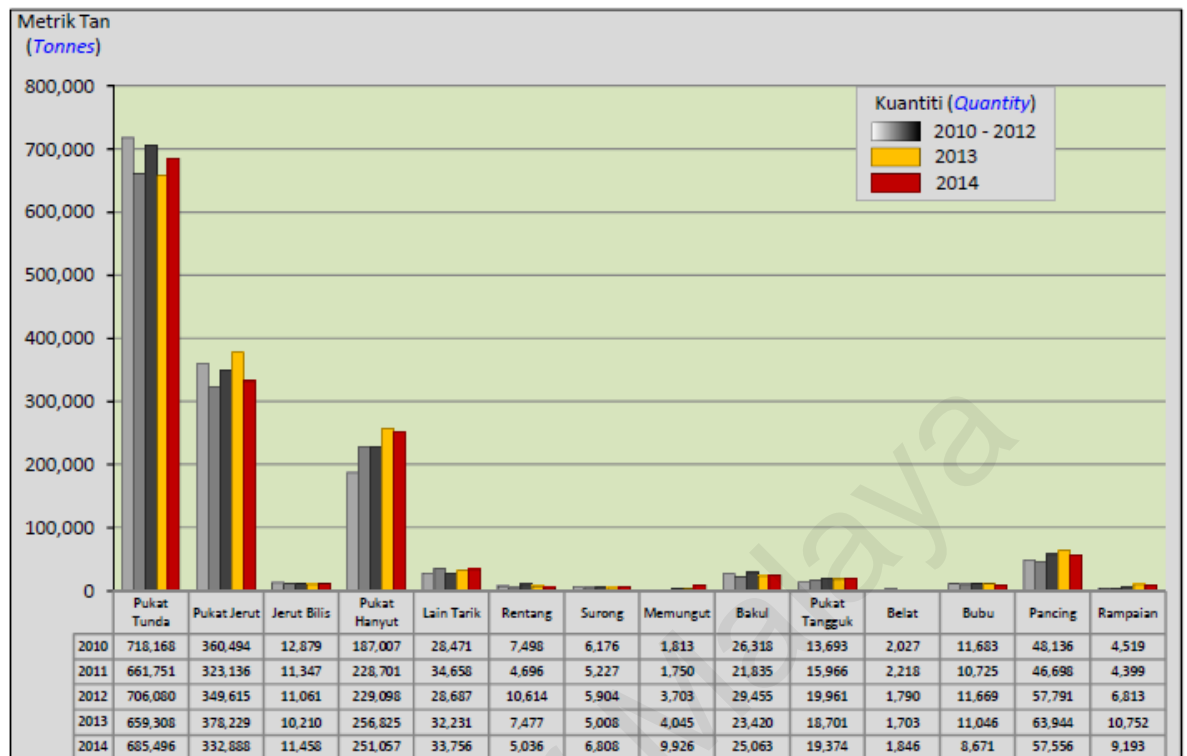


Figure 1. 3: Landing by Gear Group (2010-2014)

(Source: Department of Fisheries of Malaysia, 2016)

Fishing vessels that are commonly used in Zone A are known as “*sampan*”, which generally mean small boat. These small boats together with the <40GRT engine are mainly used by the traditional fishermen, particularly the owner of the vessel itself, and one assistant (Figure 1.4). As weather is predictable, and fishermen might not be able to leave the sea immediately if it rains, hence, some fishermen spend a bit of money to upgrade their small boat by putting on canopy (Figure 1.5).

Table 1. 1: Landing of Capture Fisheries (2013-2016)

(RM million)

Year	2013		2014		2015		2016	
Zone	Coastal	Deep-Sea	Coastal	Deep-Sea	Coastal	Deep-Sea	Coastal	Deep-Sea
West Coast	3,839.19	511.32	4,598.56	455.77	4,952.92	425.46	5,504.15	467.19
Perlis	479.91	104.97	542.19	76.75	456.64	78.30	532.82	76.10
Kedah	726.15	50.28	1,299.39	30.08	1,267.77	21.78	1,383.25	35.02
Pulau Pinang	449.97	-	463.13	-	482.23	-	603.57	1.84
Perak	1,423.87	353.81	1,524.08	346.20	1,687.45	325.38	1,833.05	354.26
Selangor	434.99	2.25	448.15	2.74	704.04	-	745.19	-
Negeri Sembilan	6.31	-	9.95	-	8.22	-	8.87	-
Melaka	21.71	-	24.36	-	25.73	-	28.00	-
West Johor	296.29	-	287.29	-	320.85	-	369.39	-
East Coast	1,165.47	649.63	1,025.75	657.69	1,059.07	1,083.86	1,343.58	1,140.60
Kelantan	116.78	128.12	131.09	153.88	232.95	524.92	424.43	671.35

Terengganu	426.47	54.23	328.87	35.67	375.82	26.04	323.02	19.61
Pahang	373.09	240.70	283.87	224.53	292.95	341.86	413.47	286.27
East Johor	249.13	226.58	281.93	243.61	157.35	191.07	182.67	163.37
Peninsular Malaysia	5,004.66	1,160.95	5,624.30	1,113.47	6,011.99	1,509.32	6,847.73	1,607.79
East Malaysia	1,605.18	565.14	1,834.09	213.53	1,647.77	152.81	1,569.51	151.24
Sarawak	535.96	130.27	617.00	143.60	621.23	104.12	648.97	103.56
Sabah	872.36	31.26	1,005.75	37.36	869.07	33.41	783.59	36.44
Federal Territory of Labuan	196.85	403.61	211.33	32.57	157.48	15.38	136.98	11.23
Grand Total	6,609.83	1,726.08	7,458.39	1,327.00	7,649.76	1,662.23	8,417.23	1,759.03
		8,335.92		8,785.39		9,322.00		10,176.26

(Source: Adapted from Department of Fisheries Malaysia, 2016)



Figure 1. 4: *Sampan* – commonly used in coastal Zone A



Figure 1. 5: Upgraded *sampan* with plastic roof

In terms of licensing for vessel and fishing equipment, the Department of Fishery Malaysia has stopped the issuance of licenses to Zone A, B and C, only international waters permits are still available as the resources from these zones are saturated (Department of Fishery , 2015).

On the other hand, to be a fisherman, one has to be registered to the area Fishermen's Association according to the Fishermen Associations Act 1971. The following are the categories of membership as stated in the Act:

Clause 11(1) – Any person who is resident within the operative area of an Area Fishermen’s Association and who has attained the age of 18 years shall be eligible to become a member of an Area Fishermen’s Association if he belongs to any of the following categories, that is to say:

- a. any person who is engaged in catching, harvesting or the culture of aquatic organisms for a minimum period of one hundred and twenty days in a year;
- b. any person who is a fish processor, handler or dealer;
- c. any person who derives sixty per cent or more of his total income from the fishery industry.

Clause 11(2) - Any person who conducts research on or is engaged in the development and improvement of the fishing industry, shall be eligible for associate membership.

1.2.2 Pangkor Island

Pangkor Island was known as Dinding Island (*Pulau Dinding*) prior to the commencement of the Pangkor Treaty (*Perjanjian Pangkor*) on 20 February 1874 between the British and the Sultan of Perak, Raja Abdullah Ibni Sultan Jaafar, after Dutch left the island due to the presence of tin-smuggling despite the building of the Dutch Fort. This treaty had resulted in James W.W. Birch being installed as the British Colonial Official of Perak and set the starting point of British Colonial era on the Peninsular (Go2Travelmalaysia, 2012). When the British stepped in, Dinding Island was renamed to Monkey Island (Pulau Kera), then to Peaceful Island (Pulau Aman) and finally to Pangkor Island which means Beautiful Island (Pangkor Gate, 2015). Pangkor Island began to be a tourist attraction ever since 1930s, which lead to continuous socio-economic development (Rus, Nordin, & Zainy, 2017).

Pangkor Island is situated at the North West of Peninsular Malaysia, off the coast of Perak, along the Malacca Straits, coordinated at 4.2200°N, 100.5550°E, 300 km north from Kuala Lumpur, the capital of Malaysia. It is an island within Perak State and is governed by the Manjung Municipal Council (Majlis Perbandaran Manjung). It is a small island with an area of 2,275 hectares (approximately 22km²) (Figure 1.6).

It is accessible in forty-five minutes by ferry from Lumut, Perak and ten minutes by ferry ride from Marina Island (Pangkor Gate, 2015). It is a hilly island with a few bays, which include Teluk Dalam, Teluk Cempedak, Teluk Gedung, Teluk Baharu, Teluk Nipah, Teluk Belanga, Teluk Nipah, Sungai Pinang Besar, Sungai Pinang Kechil, Pangkor town and Coral Bay together with Pangkor Hill at the center of the island, North and South Pangkor Hill and Tortoise Hill as shown in Figure 1.6 below. The smaller islands around it include Pangkor Laut, Giam Island, Mentagor Island and Talang Island.

Due to the hilly areas at the center of Pangkor Island, it is always being referred to as a mountainous island. This hilly natural structure results in oval settlement pattern across the island, and only 16% of the island is occupied and developed while the remaining 84% are forest (Omar, Noor, & Kassim, 2017). Pangkor Island is rich with natural resources, particularly resources from the sea. Therefore, a majority of the residents, especially male residents, are fishermen, particularly coastal fishermen.

The Manjung Municipal Council (2016) stated that tourist visits to Pangkor Island has increased from year 2010 to 2015 as depicted in Figure 1.7. In year 2010, number of tourists visiting was around 700,000, and in year 2016, the number of tourists rose to more than 1 million.

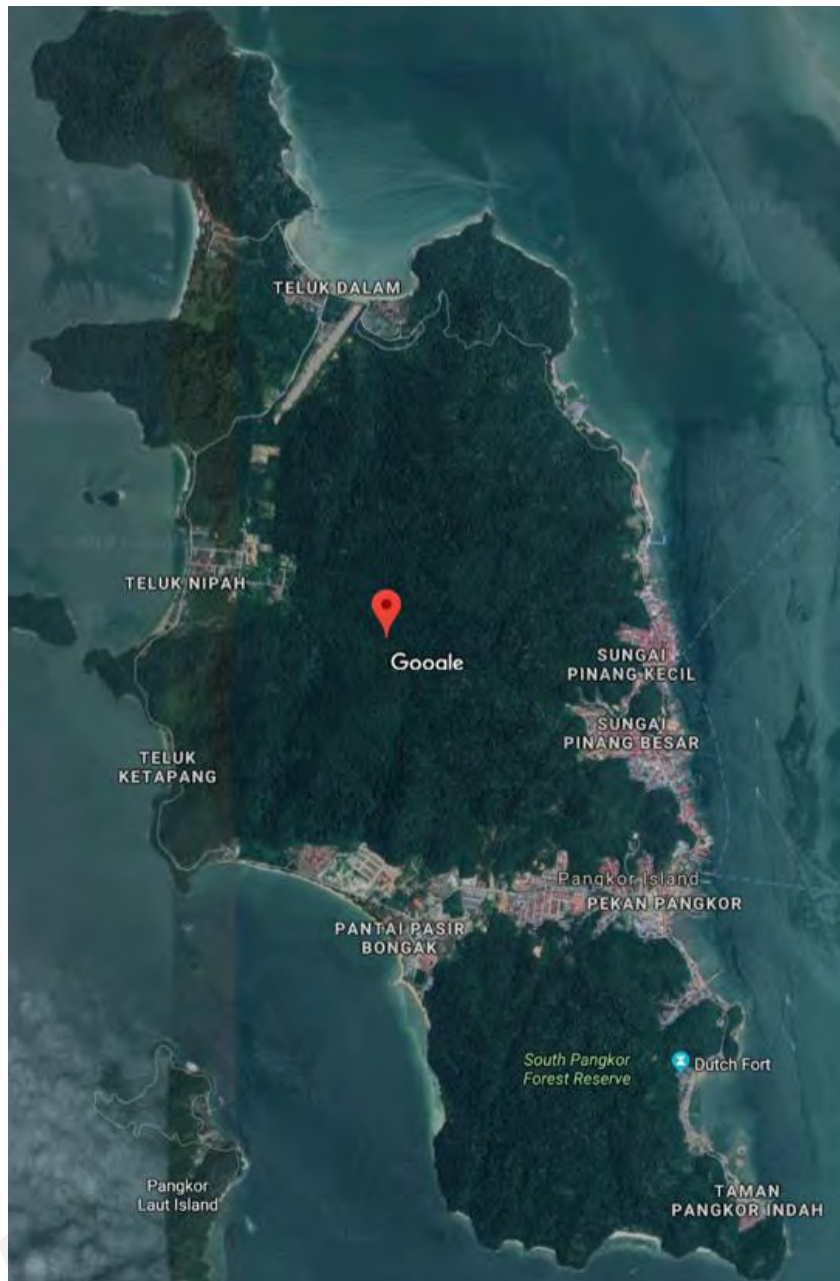


Figure 1. 6: Pangkor Island Map

(Source: (Google Maps, 2018))

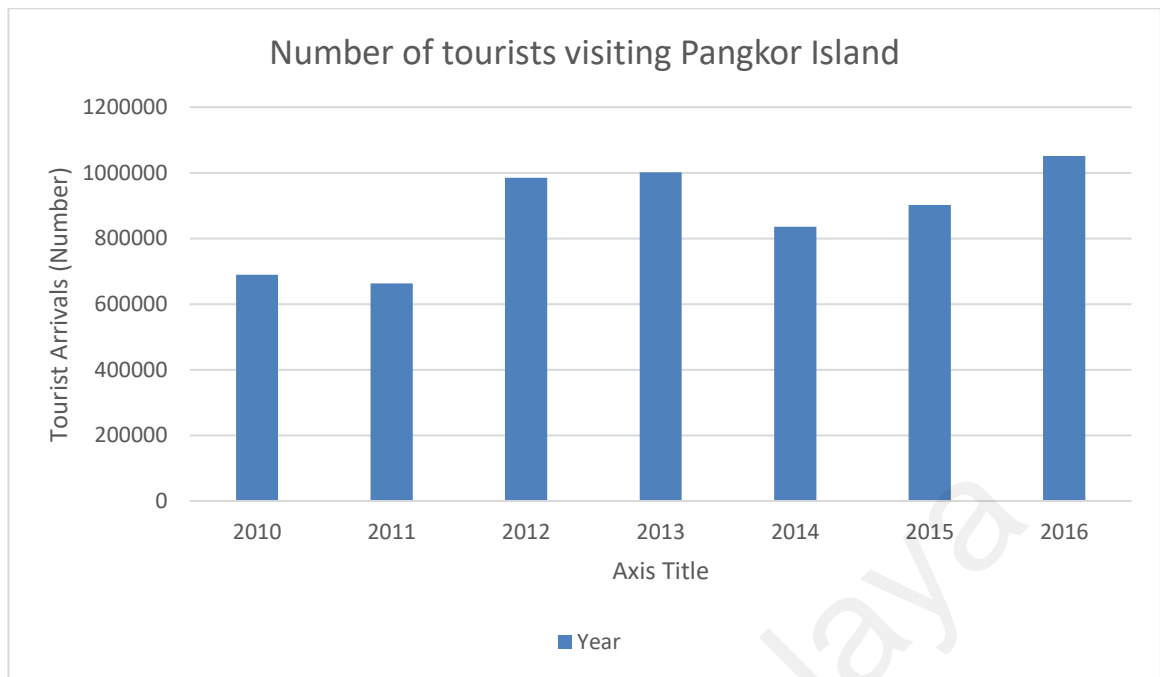


Figure 1. 7: Tourist arrivals to Pangkor Island Year 2010-2016

(Source: Manjung Municipal Council, 2016)

Besides, a few projects have been completed on Pangkor Island recently. One of the mega projects is the floating mosque, which was completed at the end of year 2016. It will be a wonderful place for not only Muslims to perform their prayers but it will also become one of the tourist attractions. Another two big projects which are currently running are to relocate some the local residents to a new building for better environment and hygiene standards. These two new apartment projects were especially offered (besides double story terraced houses in Teluk Gedung) to those fishermen who have been staying in rundown houses along the main road, of which one block is specially allocated for the Muslim community and the other for the non-Muslims. Furthermore, renovation grant is made available for some houses located on the main road for upgrading, like replacement of rooftops, turning wooden houses into concrete houses, etc., of which the level of renovation depends largely on the condition of each unit.

To attract more tourists onto the island, a few development plans have been put in place. Firstly, declaring Pangkor Island as a duty-free island, excluding alcoholic beverages, tobacco and motor vehicles (Ministry of Finance Malaysia, 2017). Secondly, to upgrade the public jetty in Pangkor Island (The Sun Daily, 2017). Thirdly, to further upgrade the fishing village areas for example upgrading fishermen's houses and setting up of temporary settlement of coastal fishermen as shown in Figure 1.8 while waiting for their houses to be upgraded.



Figure 1. 8: Temporary settlement of coastal fishermen

Besides, to overcome the issue of unorganized commercial premises plan on the island, mixed commercial area around Pangkor Town, Pasir Bogak and Sungai Pinang Kechil were suggested as well. This development is crucial for the development of business sector and subsequently to support the socio-economic development (Goh & Mohamad, 2017).

With continuous development projects which had taken place in the Pangkor Island, it had received over one million visitors in year 2016. This number will continue to

increase as the Manjung Development Plan 2030 is preparing to speed up the development of tourism industry on Pangkor Island in the area of islands and beaches, history, eco-tourism, as well as sports and recreation (Noor, Zain, Hariz-Zain, Awang, & Ghani, 2017).

There are numerous hotels on this small island which are ready to welcome tourists, providing tourists with comfortable, exciting and wonderful trip. Besides that, tourists can explore the numerous beaches with rented car or motor-cycles. On top of that, there are many tours and watersports prepared by tour guides on Pangkor Island for tourists to engage in watersports activities include boat rides, snorkeling, kayaking, island hopping, etc.

Tan & Teh (2001) stated that the natural elements, sand, sun and sea are the main reasons for global tourists to choose Pangkor Island as a relaxing holiday destination. The well maintained and strategic development work done has improve the image of Pangkor Island in the eyes of the world. Therefore, continuous strategic development planning has to be in place for the continuous development of the island.

1.2.3 Pangkor Island Fishermen

In 2014, there were a total of 143,421 fishermen in Malaysia, a decrease of 598 as compared to year 2013. The total consisted of 107,109 (74.7%) Malaysians comprising of 79,573 (55.5%) Bumiputeras, 22,142 (15.4%) Chinese, 972 (0.7%) Indians and 4,422 (3.1%) other races. The remaining 36,313 (25.3%) fishermen were foreigners mainly from Thailand 24,172 (16.9%), Indonesia 2,018 (1.4%) and Vietnam 3,109 (2.2%) (Department of Fishery , 2015).

In the same year, Fishermen's Association of Pangkor Island reported that they have 897 fishermen registered with them, which consisted of 635 Bumiputras, 198 Chinese and 64 Indians (Fishermen Association of Pangkor Island, 2014).

Fishermen villages are scattered around the bays, with the majority of them found in Teluk Dalam, Sungai Pinang Kecil, Sungai Pinang Besar and Teluk Gedung. Other demographic details such as age, household size and education level will be recorded through quantitative data analysis. Figure 1.9 shows the current fishermen's houses in Teluk Gedung, some fishermen houses are made out of wood, while others a mixture of wood and bricks. The back of these houses is where fishermen anchor their fishing boat, which makes loading, offloading and net repairing work more efficient.



Figure 1. 9: Current fishermen's' houses in Teluk Gedung

There is no record found on the number of fishermen on this island according to the type of fishing gear used. However, the Department of Fisheries of Malaysia (2016) has reported that the majority of the fishermen in the State of Perak (where Pangkor Island

is located) are using drift and gill net, trawl net and fish purse seines, which reflected that most of the fishermen in this state are coastal fishermen.

1.3 Problem Statement

Raduan, Sharir and Aziz (2007) reported in their study that main problem in fishing faced by fishermen in Peninsular Malaysia was the extinction of fish resources within coastal areas, followed by misappropriation of subsidies, high operation cost, shallow estuary and the threat of monsoon. Extinction of fish resources does not happen in Malaysia alone, fisheries worldwide are facing a decline in fisheries output since the late 1980s (Pauly, Christensen, Guénette, Pitcher, Sumaila, Walters, Watson & Zeller, 2002), which could result in socio-economic difficulties for the fishing communities (Sumaila, Gue'nette, Alder, & Chuenpagdee, 2000). Being the major contributor of National Fishery Sector Production Value in 2014, the conditions could be detrimental to the fishery industry and therefore, appropriate diversification and livelihood portfolio need to be looked into urgently to increase the level of sustainable livelihood outcomes.

DFID Sustainable Livelihood Framework has indicated that livelihood strategies (livelihood portfolio) is needed to achieve livelihood outcomes. In Malaysia, the LKIM together with the state government, has started modernizing fishing operations as well as agricultural sector by subsidizing gadgets, machinery, fertilisers, boats and seeds since the 1970s along with their efforts of poverty alleviation (Hassan, Othman, & Rasiah, 2011). A research done by (Masud, Kari, Yahaya, & Al-Amin, 2016) on Marine Park Areas in Peninsular Malaysia showed that with the introduction of marine park areas, a large number of fishermen had switched their career from being a fisherman to other professions. These efforts showed that opportunities had been given from time to time for fishermen in the country to intensify, diversify and migrate their livelihood strategies.

However, how much livelihood strategies are going to affect livelihood outcomes still remains a question mark to-date, as the existing sustainable livelihood frameworks are not ready to be generalized.

Besides that, Farrington, Carney, Ashley and Turton (1999) have identified that the knowledge gap of DFID Sustainable Livelihood Framework can be very complex but is not able to produce conclusive answers. It is widely used in assessing the contribution of the existing development projects to livelihood sustainability, which revealed the strength and weaknesses of the project (DFID, 1999). This analysis will then be used as reference to plan for the next development. However, it is not a standardized framework which can be generalized as the definitions of sustainable livelihoods is often unclear and inconsistent (Carswell, 1997). Sustainable livelihood as well as livelihood outcome differ from one individual, household, community to another. Therefore, it cannot be generalized to provide answers to the existence of sustainable livelihood issues in every community unless a study is being carried out in that particular community. In other words, detailed research has to be done in order to understand how the coastal fishermen of Pangkor Island perceived sustainable livelihood, in this case, sustainable income.

Furthermore, DFID Sustainable Livelihood Framework is supposed to be a people-focused framework, but human capital in the livelihood assets component of DFID Sustainable Livelihood Framework only focused on the knowledge a community has, and their willingness to attain new knowledge (Teh, Cheung, Cornish, & Chu, 2008). It does not look into the willingness of the community to change or venture into other sectors to enhance their livelihood portfolio, i.e. combination of livelihood strategies, and subsequently reduce the level of vulnerability context and improve livelihood outcomes. The framework revealed the relationship between human capital and transforming structures and processes. In other words, how institutions, organizations, policies and legislations can enhance the knowledge and skills of the community studied. However,

members of a community may have all the necessary knowledge and skills to expand their livelihood strategies, but may not be able to achieve the expected livelihood outcome due to individual attitude towards change. Therefore, it will result in the failure of further transforming structures and processes. According to the International Fund for Agricultural Development, many researches have been done on the willingness or readiness to change which included George (2008) and Awortwi (2013), but very minimal has been done on the community willingness or readiness to change and how it affects the choice of livelihood strategies (IFAD, 2015). Feasibility study done by the researcher seemed to reveal that Pangkor Island coastal fishermen are comfortable with what they are earning and living with, even though they agreed that they are struggling with their daily expenses, with some of them willing or are trying to learn new skills or venture into the tourism industry. However, the actual relationship between willingness to change and how it affects the choice of livelihood strategies still remains unknown.

Livelihood approach had always sought to promote choice, opportunity and diversity for a particular community (DFID, 1999; IFAD, 2015; Teh et al., 2008). The choice, opportunity and diversity here is about what the authorities and policy makers can do to improve the said elements. According to Islam, Noh, Sidique, Noh and Ali (2014), proper management of the distribution of the allocation of government spending for fishermen is one of the crucial factors to achieving sustainable resources and sustainable livelihood for the fishermen community. Hence, by understanding how the fishermen make decisions on improving their livelihood strategies, it will help the policy makers to put the right development and fiscal plans in place, not only to support this community directly, but also to encourage the operator of other industries in providing the right opportunities for the fishermen to improve their livelihood strategies.

1.4 Research Goal and Objectives

The main aim of this study is to establish the guideline in promoting the livelihood of the coastal fishermen through the establishment of relationship between livelihood strategies and the factors affecting the choice of livelihood strategies. This research has the following objectives:

- i. To obtain a basic understanding of Pangkor Island coastal fishermen with regards to the factors affecting their choice of livelihood strategies.
- ii. To investigate the relationship between livelihood strategies and sustainable income of coastal fishermen on Pangkor Island.
- iii. To analyze the role of willingness to change in determining the choice of livelihood strategies.
- iv. To provide recommendations regarding policy implementation to improve livelihood of coastal fishermen of Pangkor Island.

1.5 Research Questions

With the knowledge gaps identified in section 1.3 and the importance of filling up the gap, it has stirred the interest of the researcher to conduct a research on examining the criteria affecting the choice of livelihood strategies (intensification and diversification) and the relationship between livelihood strategies and sustainable income. On top of that, the researcher also studied the role of willingness to change in affecting the respondents' point of view about sustainable income. This research aimed to answer the following research questions:

- i. Are socio-demographic factors able to predict the choice of livelihood strategies?
- ii. Will the trend of income and trend of output determine the choice of livelihood strategies?

- iii. Will risk carried by fishermen affect their choice of livelihood strategies?
- iv. What is the relationship between the coastal fishermen aim of sustainable income and the choice of livelihood strategies they have made?
- v. Will the willingness to change affect the choice of livelihood strategies made by coastal fishermen?

1.6 Research Methodology

Based on the research goal and objectives, this study is descriptive, correlational and exploratory in nature. Hence, this study adopted a mixed methodological approach. The exploratory nature of this study was interested in an in-dept study, i.e. to explore factors determining choice of livelihood strategies. Exploratory sequential mixed method approach was chosen as opposed to other types of mixed methodological approaches available. This research started off with qualitative approach to explore ground information as the existing sustainable livelihood framework cannot be generalized. Then quantitative approach was adopted to further validate and quantify information gathered. In other words, adopting a mixture of quantitative and qualitative approach has led to complementary effect, whereby weaknesses of one method was overcome by the other.

1.7 Significance of The Research

Coastal fishery sector is a major contributor to the fishing output of Malaysia as mentioned in the previous sections. In other words, the income generated by the coastal fishermen is not only important for the fishermen community, but it is equally important for the nation as it affects the GDP of the country.

Sustainable income is not a standardized objective for every individual, household or community. Detailed research has to be conducted on a particular community to

understand their livelihood outcomes. Through this research, a more solid understanding about Pangkor Island's fishermen's livelihood outcome were achieved. This understanding is important for the upcoming fiscal planning and implementation of any current policies related to the community (Gilberthorpe, 2013).

Furthermore, this research used DFID and IDS sustainable livelihood frameworks as a reference to kick start the research as both frameworks cannot be generalized and this research is focused on sustainable income, instead of every dimension included in both frameworks. The study is focused more on the criteria affecting livelihood strategies and relationship between livelihood strategies and sustainable income. At the same time, the research also looked into the role of willingness to change in the achievement of sustainable income. Therefore, the outcome of this research can be used as one of the starting points of studying sustainable livelihoods in Malaysia context. Hence, it can be a comprehensive guide to future researchers who intend to apply a more relevant sustainable livelihood framework.

By testing fishermen's attitude towards change, i.e. willingness to learn and willingness to venture, and the relationship between these two variables and the fishermen's expectation on sustainable income, the State Government, DOF, LKIM and Fishermen's Association will be able to measure the possible outcome on the upcoming development plan related to coastal fishermen community. It is a good reference for the said authorities to work on suitable motivation program for the fishermen community to enhance their level of adaptability to change, if needed.

This research acts as a bridge between the operators of other industries and the coastal fishermen community by providing information on what fishermen have (livelihood strategies) to offer to other industries, and their willingness to take up new opportunities. On top of that, the research also revealed the motivators towards choice of

livelihood strategies, which is useful especially for other operators who has already been employing the said community. These related operators will have a better idea on how to motivate them or fit them into the right position.

In summary, this research is significant for a broad range of stakeholders, which includes the fiscal planner, DOF, LKIM, Fishermen's Associations, future researchers, operators of other industries and of course, the coastal fishermen community. Deeper understanding of the relationship between livelihood strategies, sustainable income and how willingness to change affects the fishermen's view about sustainable income is truly important for the development of a community and improve their livelihood sustainability.

1.8 Scope of Research

The results of the research fully depend on the responses and feedbacks from the volunteer respondents on Pangkor Island. Results was generated through the analysis of real and raw data collected through two different types of interview sessions. However, the following limitations were still identified throughout the research.

- a. Similar to the existing sustainable livelihoods frameworks, results of the study represents the fishermen on Pangkor Island only, hence the framework cannot be generalized to the overall picture for the fishermen from other areas unless the framework generated here is being tested on other communities as mentioned.
- b. The data reflect view of sustainable income at the time of data collection, which might not represent their view at all time their view may change for various reasons.
- c. The personal information such as income level, age, external support received, level of savings and borrowing, etc are provided by the respondents alone, of

which cross checking is deemed to be impossible due to the shortage of up to date fishery data. Hence, some respondents might have given false information to protect their own privacy or personal interest.

1.9 Organization of Thesis

This thesis aims at determining providing recommendation on ways to improves livelihood of the coastal fishermen through the establishment of relationship between factors determining choice of livelihood strategies and ultimately relationship between livelihood strategies and the expected livelihood outcomes. In this chapter, background of study area, the significance of this study, goal and objectives of the study, research questions and subsequently scope of study was introduced.

Chapter 2 provides detailed definitions of each variables explored together with the overall meaning of sustainable livelihood and how each variable is measured in the past. It also introduces a few relevant sustainable livelihood frameworks which are available at the point of study, which shows the importance of carrying out a customized study based on the nature and needs of each community, and the importance of including willingness to change into sustainable livelihood study. Furthermore, a glimpse of relevant past researches is presented based on each variable. With that background knowledge, a conceptual framework is formed, and 7 main research hypotheses were raised.

Chapter 3 presents the research methodologies adopted. The research design map is presented in a flowchart to provide reader with a better idea on how this research was carried out. Methodology adopted is exploratory sequential mixed method, where the research started off with qualitative data collection phase, followed by quantitative instrument design and followed by quantitative data collection phase. Detail of how each

phase is carried out, instruments used in each phase and the data analysis approaches adopted in each phase is presented as well. The chapter ends with steps taken throughout the research in maintaining research ethics.

Chapter 4 consists of the 8 major findings arising from qualitative data collection phase, which include trend of income, coping strategies, short term and long-term plan in managing with extra income, respondents view of subsidies, livelihood intensification strategies, resources available to adopt diversification strategies, current source of income from non-fishing activities, respondents view of sustainable livelihood and their satisfaction level of current livelihood outcome.

Chapter 5 on the other hand, presents the research findings from quantitative data collection phase. Result of reliability test and validity tests are presented. The chapter continue on with the presentation of respondents' profile, which include age group, gender, marital status, race, education level, level of involvement in fishing activities and level of income. Result of statistical analyses i.e. result of structural equation modelling analysis and Pearson correlation tests are presented right after. The chapter ends with result of hypotheses testing.

Chapter 6 consists of discussion of findings and recommendation on policy implementation. The discussion is presented based on research objectives and the result of hypotheses testing. Furthermore, recommendations on how to enhance the implementation of fishing related policies are presented to tie up with the last research objective.

Finally, Chapter 6, the researcher wraps up the thesis by presenting conclusions of theses, limitation of study and recommendation for future research.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

The aim of literature review is to provide the researcher a basic understanding on sustainable livelihood studies, particularly in the Asian context. Therefore, literature review in this study was done not just before data collection, but also throughout the qualitative data collection process, and towards the end of the research writing. This is deemed to be important to provide the reader a clearer picture on study area from various angles.

With that in mind, this chapter is organized as follows: (1) definitions of terminologies used, (2) review of existing relevant frameworks (3) examples of relevant sustainable livelihood studies done in the past, (4) types of livelihood strategies, and lastly (5) the conceptual framework.

2.2 Definition of Concept

2.2.1 Sustainable Income

Sustainable income is one of the elements of livelihood outcomes as livelihood outcomes include increase in income, improvement of well-being, and reduction of vulnerability. Since it is a broad range of study, the researcher has decided to look into one of the most important elements, i.e. income.

Sustainable income has been defined by DFID (1999) as a simple increase in net returns to the activities undertaken and overall increases in the amount of money coming into the household. The same source also mentioned that an increase in income relates to the idea of the economic sustainability of livelihoods. In another context, such as firm, sustainable income is defined as the generally accepted accounting principles income minus realized holding gains or in layman terms, sustainable income equals to revenues

less the current cost of goods sold, less current cost of depreciation, less all other expenses (Easman Jr., Falkenstein, & Weil, 1979). On the other hand, in the context of environmental sustainability, sustainable income is defined as the net national product less allowance for depreciation of environmental capital. In other words, there is no specific or standardized definition of sustainable income.

Increase of income is closely related to poverty reduction, a term which is commonly used and assessed in the sustainable livelihood studies. Various tools can be used to measure income or consumption levels (Bob, 1996), a combination of qualitative and quantitative methods is commonly used (Shaffer, 1996).

However, satisfactory income, or even sustainable income is different from one country to another. For example, in the United States, a family of three will be categorized as low-income earner if their total household income is less than USD 33,000 per year (US Department of Health and Human Services, 2006). Malaysia on the other hand define poor as those with monthly household income of less than RM760 in Peninsular Malaysia, less than RM1,050 in Sabah and less than RM910 in Sarawak (Jala, 2015).

According to the Department of Statistics Malaysia (2016), the mean of monthly income by strata is RM2,514 for those who live in the urban area, and RM1,617 for rural residents, which is above the “poor group”. However, does that means it is sustainable? According to the AgedCare (2016), most Malaysians are not prepared for retirement. This is mainly because many homemakers and self-employed group, which of course includes small-scale fishermen, i.e. majority of coastal fishermen, do not have sufficient savings or made no contribution to the Employees Provident Fund (EPF). Besides personal savings, EPF contributions is seen to be the basic retirement plan, in other words, no EPF contribution will mean no sustainable income after retirement. To make it worst AgedCare (2016) further explained that life expectancy in Malaysia has increased to an

average of 75 years old, which means even for those Malaysians who had made EPF contributions may not have enough income after their retirement to sustain their life, what more fishermen who doesn't have it at all?

In other words, the meaning of sustainable income does not only vary based on context, it also varies based on country and community, or even the individual's perception. In this research, to understand how the coastal fishermen of Pangkor Island perceive sustainable income, the researcher focused on asking questions such as if the current income is considered to be sustainable, for example if it is enough to improve their standard of living, i.e. support their children's higher education, holiday, various source of income, etc. or if it is sustainable when income earned is consistent.

2.2.2 Coping Strategies

According to Folkman & Lazarus (1980), coping strategies refer to "the specific efforts, both behavioral and psychological, that people employ to master, tolerate, reduce or minimize stressful events". In the sense of this study, coping strategies will mean efforts taken by the coastal fishermen in overcoming the stress of insufficient or shortage of income.

According to research done by Shariff and Khor (2008) on coping strategies of food security, it was reported that there were nine coping strategies applied by the poor rural communities of Malaysia, which included (1) reduce daily / monthly spending, (2) use savings, (3) borrow money, (4) sell valuable assets (jewelry, land, etc.), (5) have a second job, (6) reduce spending on children's education, (7) get cheaper treatment for illness, (8) get medical treatment only when situation gets worse and (9) stay at current place. Even though rural communities are mainly farmers, while this research is about the coastal fishermen, however, it is important to note that the nine coping strategies

mentioned by Shariff and Khor (2008) are common strategies which may at some point applicable to other communities. Further study is still needed to evaluate its applicability.

Corbett (1988) classified coping strategies into precautionary strategies and critical strategies. Precautionary strategies mainly referred to household preparation strategies to cope with regular crisis, while critical strategies refer to action taken by household in coping with unusual crisis. These pre and post crisis coping strategies are both significant, however, for community in a “more peaceful” location, the sense of these coping strategies may not be seen just yet.

Cutler (1986) identified three coping strategies in the following sequence, (1) adaptive strategies, which include sales of livestock, use of credit as well as self-employment; (2) sale of key productive assets, which includes selling of tools or land which can be used to produce future income; and (3) mass migration. In other words, one may have tried to apply the first strategy before the next two.

Narrowing down to the coping strategies available to the coastal fishermen in the event of climate change, Cinner et al. (2018) have identified five strategies which may be made available to the said community, including assets which can be used by the coastal fishermen to face climate change, flexibility or opportunity available for the coastal fishermen to adopt intensification or diversification strategy, social organization which the coastal fishermen has access to enable collective action in facing climate change, learning opportunity available for the coastal fishermen to gain updated information or master new skills and lastly, choices the coastal fishermen has in making a choice. Cinner et al (2018) emphasized that the said coping strategies availability and usefulness may varies from one community to another, and most importantly, there may be trade off of one coping strategy to build another.

In other words, even though coping strategies may vary from one community to another, or one situation to another, their main purpose is still to minimize the impact of uncertainty. Besides, literature review also shows that there are no standardized coping strategies which can be generalized to all communities. Therefore, coping strategies suggested by past researchers were used as part of the guided question for open ended interview sessions (qualitative data collection phase). However, not every coping strategy was applicable to the coastal fishermen of Pangkor Island.

2.2.3 Risk Associated with Fishing Activities

Smith, Barret and Box (2000) defined risk as the exposure to potentially unfavourable conditions or circumstances that can result in economic, cultural or physical loss. The Economic Times (n.d.) on the other hand defined risk as “future uncertainty about deviation from expected earnings or expected outcome. In other words, risk measures the uncertainty that one is willing to take to realize a gain from the action taken”.

DFID (1999) uses a different term to represent risk, i.e. vulnerability, and defined it as the critical trends, shocks and seasonality which affect people’s livelihoods and availability of assets, or which they have limited or no control. Scoones (1998) explained that choice of livelihood strategies will depend on the level the risk carries. For example, choosing livelihood diversification to diversify risk of one source of income.

Research done by Smith (1988) revealed that risks carried by fishermen include bad weather, amount of output per fishing trip, price of fishing output, risk of being cheated by the fishmonger, accident at sea, etc. Kasperski and Holland (2013) on the other hand pointed out that fishing itself is a risky business, as a result of inconsistency of monthly income and risk of work-related fatalities.

In other words, people's perception of risk varies from one community, household or individual to another. People living in the same environmental condition, sharing similar culture or even having the same profession could view risk differently. For example, Quinn, Huby, Kiwasila, and Lovett (2003) noted that in Tanzania, weather and irrigation problems faced by the same group of farmers perceived the risk these two conditions brought to them differently.

In this research, risk is defined as the unfavorable condition that can affect the choice of livelihood strategies. Hence, risk associated with fishing activities such as health issues, lack of fund to purchase bait, no output, fishing equipment malfunction or loss and climate change which causes accidents or lesser working days are taken into consideration. These risks were picked up through the qualitative data collection phase.

2.2.4 Willingness to change

Willingness to change can be defined as the desire to grow, openness to change and the ability to accept new experiences into one's life (Anthony, 2015). Moran (2012) provided a more detailed explanation of willingness to change, i.e. "true willingness to change requires not only a willingness to commit to new actions, but also the willingness to simply notice one's fears without working to get rid of them". Changing Minds (n.d.) stated that "willingness to change is a measure of the cognitive and emotional buy-in to the change". Changing Minds (n.d.) had divided willingness to change into three categories, which included understanding the reasons for change, accepting the necessity to change and having the desire to engage in change.

Given the positive relationship between livelihood strategies and livelihood outcomes (DFID, 1999; Scoones, 1998), it is still an important factor that influence the population's willingness to change. Many researchers who worked on sustainable

livelihood studies have studied various factors affecting livelihood strategies, which included demographic characteristics (Turban, Campion, & Eyring, 1992), family concerns and community issues (Noe & Barber., 1993), attitudinal variables (Eby & Russell, 2000) and others.

However, not many studies were done on fishermen's willingness to change and how it will affect the fishermen's choice of livelihood strategies. One of the few includes Teh et al. (2008), who studied on the alternative livelihood options for Hong Kong's fishermen to improve their livelihood and their willingness to take up the opportunities and change to other industry.

In this research, willingness to change is accessed through the fishermen's willingness to find ways to increase their level of income, willingness to take up stable side income job, and willingness to increase the number of working days.

On the other hand, willingness to learn can be defined as learning from experience and applying the lessons of experience to improve future performance (Eichinger & Lombardo, 2004).

In business terms, willingness to learn refers to the "human desire, cheerfully consenting or readiness to know new things and to improve oneself, which includes the desire and passion for improving professional skills and competencies" (Business Phrases, 2010).

A research done by Darban and Polites (2016) studied one's willingness to learn through the following questions, i.e. "I would plan on using ... in the future, I would intend to continue using ... in the future, and I expect my use of ... to continue in the future". A similar study was done on fishermen's willingness to learn the use of global positioning system (GPS) to improve productivity (Bolong, Omar, D'Silva, Shaffril, & Osman, 2014). Both researches show that the level of willingness to learn is affected by

one's age, education background, knowledge about the new things introduced, and the amount of training available.

Hence, in this research, willingness to learn refers to the coastal fishermen's willingness to attend courses in the future, receive industrial training and gaining new knowledge. This, coupled with willingness to change should reflect the first definition mentioned in this section, i.e. definition by Eichinger and Lombardo (2004)

2.2.5 Livelihood Strategies

Livelihood strategies were theorized using the sustainable livelihood framework such as DFID Sustainable Livelihood Framework. Livelihood strategies include a range of daily activities of making a living (Leonard, 1998) which is also called the livelihood portfolio, a portfolio that plays an important role in strengthening livelihood outcomes of a community (Stephen, 1991; Radcliffe, 2006; Daskon & Binns, 2010).

It has long been argued that livelihood strategies are influenced by the access to the five livelihood capitals, i.e. human capital, social capital, financial capital, natural capital and physical capital (DFID, 1999). It is also argued that to analyse the impact one industry has on the community; it can only be done through the analysis of the change of access to each of the said capitals as a result of the existence of this particular industry. In other words, how much access they have to the said capitals, will determine what kind of livelihood strategies they have and therefore how much livelihood outcomes they can achieve (Hinojosa, 2013).

The Institute of Development Studies (IDS) has identified three major clusters of livelihood strategies, i.e. agricultural (livestock rearing, aquaculture, forestry, fishery, etc) intensification, livelihood diversification and migration. In other words, one can choose

to increase their labour inputs, or venture into off-farm income earning activities, or move away totally from what they are doing currently by moving into other agriculture sectors, off farm industry or move geographically into other places. Livelihood diversification is preferred in many communities as it is aimed at reducing vulnerability of the main livelihood activity (Scoones, 1998).

In this research, livelihood strategies are defined as the strategies, job or work adopted by the coastal fishermen to generate income. Since a feasibility study done showed that migration is generally not applicable to the coastal fishermen of Pangkor Island, hence only two strategies, i.e. livelihood intensification and livelihood diversification are taken into consideration in this research.

2.2.6 Livelihood Outcome

Generally, livelihood outcome was defined as the achievements or outputs of livelihood strategies (DFID, 1999; Srisantisuk, 2015). It can be affected by sets of asset-related variables, livelihood choice and other factors (Tuyen, Lim, Cameron, & Huong, 2014).

DFID (1999) has identified a few types of livelihood outcomes, which included more income, increased well-being, reduced vulnerability, improved food security and more sustainable use of natural resources. Scoones (1998) had listed down five similar types of livelihood outcomes, excluding improved food security and introduced livelihood adaptation.

According to DFID (1999), one should not jump to quick conclusion about the nature of the livelihood outcomes someone is pursuing. For example, to one individual, maximizing income might simply mean achieving sustainable livelihood outcome, while

for others, other elements of livelihood outcomes might be more significant than obtaining higher level of income.

In this research, livelihood outcome is defined as the achievement of livelihood strategies based on the choice of strategies made and willingness to change.

2.2.7 Sustainable Livelihood

Chamber and Conway (1992), who came up with the most commonly used definition of sustainable livelihood, stated that “A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and provide sustainable livelihood opportunities for the next generations; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term”.

In 1998, IDS had presented a more comprehensive and shorter definition of sustainable livelihood, i.e. “A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base.” (Scoones, 1998).

However, as sustainable livelihood varies from one individual or community to the other, due to different sustainable outcome objectives (DFID, 1999), there is no any standardized definition for it.

Hence, in this research, the focus of sustainable livelihood is on the respondents’ perception of sustainable outcome, particularly sustainable income, and their choice of livelihood strategies to achieve the said outcome.

2.3 Sustainable Livelihoods Framework

The Sustainable Livelihoods Framework demonstrated the way to improve the understanding about a poor community. The first “people oriented” study originated from Chamber and Conway in 1992. This framework has set a foundation for the development of other livelihood frameworks mainly by development agencies. The following are some of the significant frameworks generated in the 1990s.

In year 1993, Oxfam, a leading UK charity organization in fighting poverty used Sustainable Livelihoods Framework to determine its aims, improving its project strategies and providing the most appropriate staff training (OXFAM, 1998) as shown in Figure 2.1. This livelihood framework is very similar to the DFID Sustainable Livelihoods Framework (which will be discussed later). However, as this framework is focused on fighting poverty, its main concept is that everyone has the right to sustainable livelihood. Oxfam also took into consideration the definition of sustainable livelihood from Chambers and Conway (1992), and emphasized that sustainability has the following four dimensions: (1) economic, (2) social, (3) institutional, and (4) ecological.

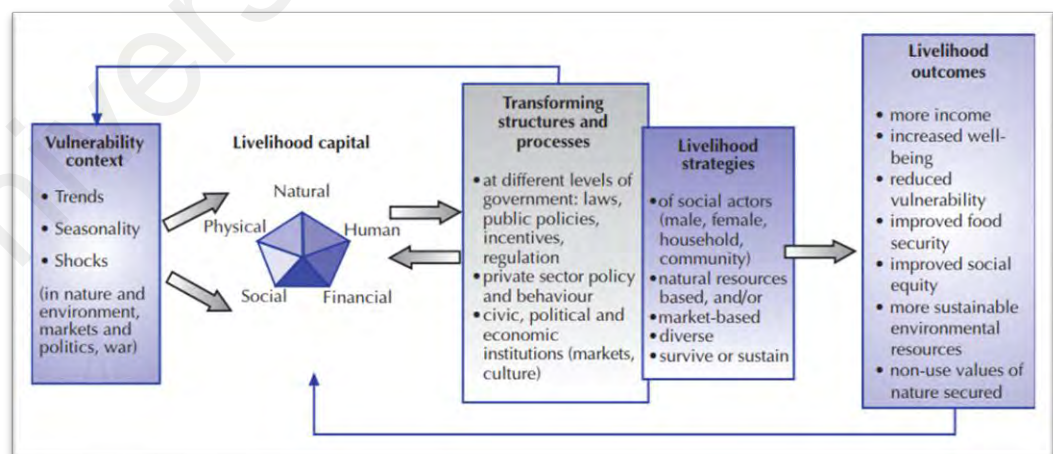


Figure 2. 1: Oxfam Sustainable Livelihoods Framework

(Source: OXFAM, 1998)

Moving on, in year 1994, a US based non-governmental organization, Cooperative for Assistance and Relief Everywhere, formally known as Cooperative for American Remittance to Europe (CARE), had formed a slightly more comprehensive sustainable livelihoods framework which they referred to as Household Livelihood Security (HLS) in Figure 2.2 below, which identified three main attributes of sustainable livelihoods, i.e. human capabilities, accessibility to both tangible and intangible assets and the availability of economic activities to generate income (CARE, 2002).

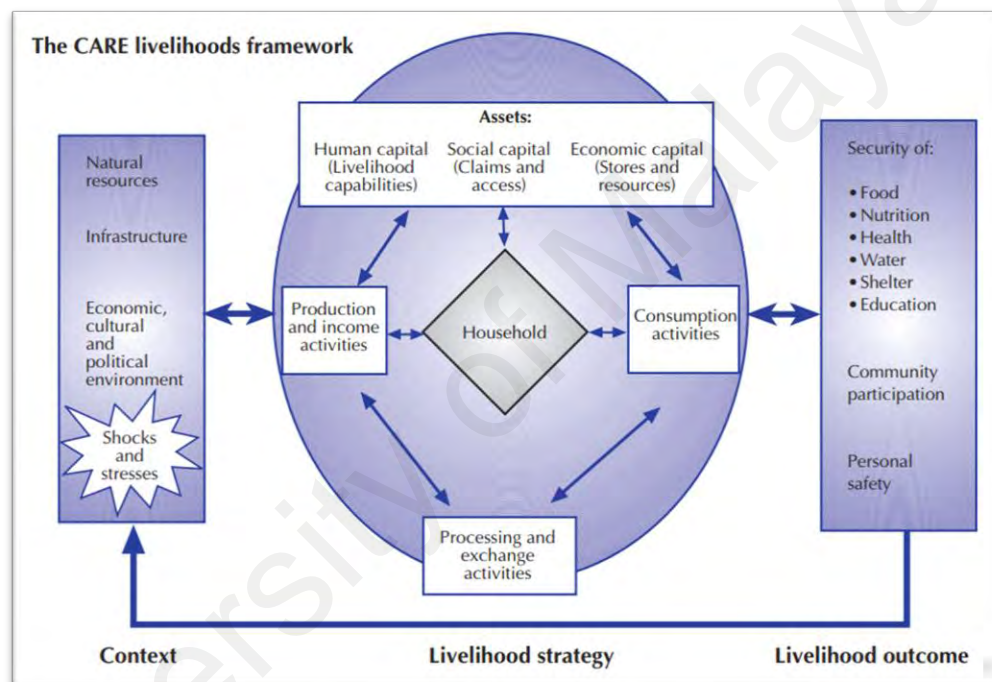


Figure 2. 2: CARE Household Livelihood Security

(Source: Drinkwater & Rusinow, 1999)

In year 1999, DFID produced a more comprehensive sustainable livelihoods framework as per Figure 2.3, aimed at increasing the effectiveness of the agency's poverty reduction projects. DFID focused not only on the importance of people-centred policies, but also policies that is responsive (involving the poor in decision making to better understand their challenges), applicable at multi-levels, conducted in partnership

(involved both public and private sector), sustainable (includes economic, institutional, social and environmental sustainability) and dynamic.

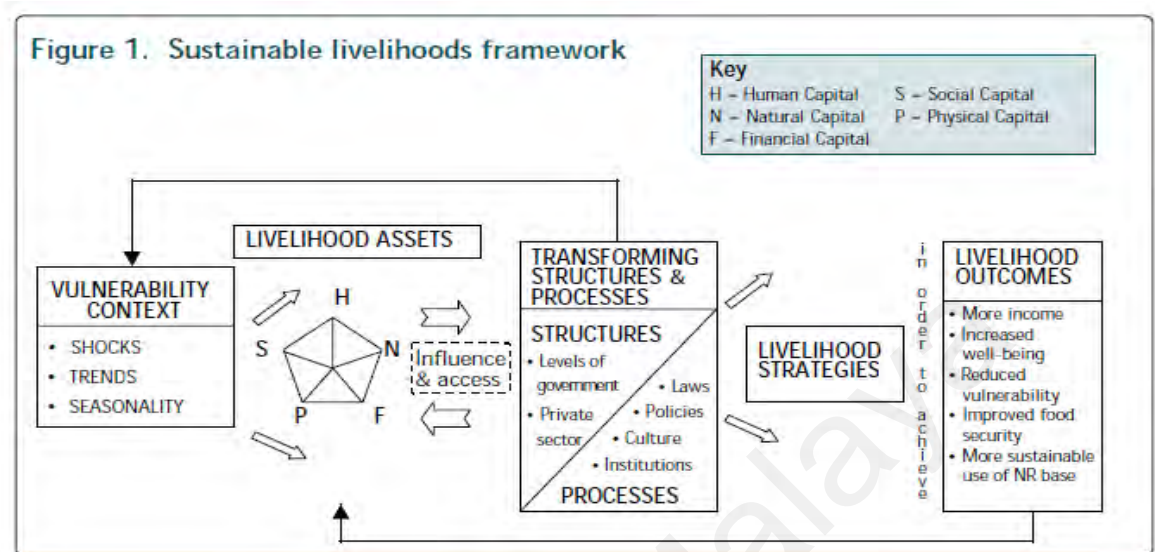


Figure 2. 3: DFID Sustainable Livelihood Framework

(Source: DFID, 1999)

The main difference between these three agencies' frameworks is that both Oxfam and CARE focused on the analysis of the success of their programs, whereas DFID focused on analysing the community, policies and structures affecting them.

DFID Sustainable Livelihood Framework was formed by five sub-sections, which include vulnerability context, livelihood assets, transforming structures and processes, livelihood strategies and livelihood outcomes. The centre of DFID sustainable livelihood framework is the livelihood assets pentagon, how external shock, policies, structures can strengthen or weaken the livelihood assets available to the community, their livelihood strategies and livelihood outcomes (sustainability) (DFID, 1999).

A simple term to link these sub-sections together is that: A community is living with a pentagon of assets (livelihood assets) that are affected significantly by the external environment (vulnerability context) of which they have no control over. The community

is also shaped by institutions, organizations, policies and legislation which oversee, manage or govern the community (transforming structures and processes). At the same time, the community concerned will have the potential, choice and opportunities (livelihood strategies) to be used to achieve sustainable livelihood (livelihood outcomes).

However, DFID (1999) clearly stated that this framework does not necessarily work from left to right in sequence in Figure 2.3 above, because livelihood is shaped by a multitude of different forces and factors that are constantly changing.

Lastly, the IDS Working Paper 72 (Scoones, 1998) has introduced a sustainable livelihood framework which is also similar to that of DFID. However, the IDS framework dealt into a bit more detail on the types of livelihood strategies, i.e. group livelihood strategies which are categorised, into. intensification, diversification and migration as shown in Figure 2.4 below. These categories are crucial in analysing the community's livelihood strategy portfolios and pathways as it allows various types of livelihood strategies to be grouped accordingly, which has helped in simplifying the analysis process.

The first type of livelihood strategies introduced was livelihood intensification which can be a result of capital intensification, whereby the population reinvest their income or profit into the same industry; or labour intensification, whereby the population are equipped to be more productive and subsequently increase the value of output per input (Tiffen, Mortimore, & Gichuki, 1994).

Another type of livelihood strategy, diversification, is about diversifying to range of non-agricultural industry. It is important to note that the term agricultural used in the IDS framework represents all kinds of farming activities, including fishing. Diversification can be carried out in a temporary or permanent manner, as long as it supports the population when the agriculture industry fails to produce the livelihood outcome they need to overcome external shock, trend and vulnerability.

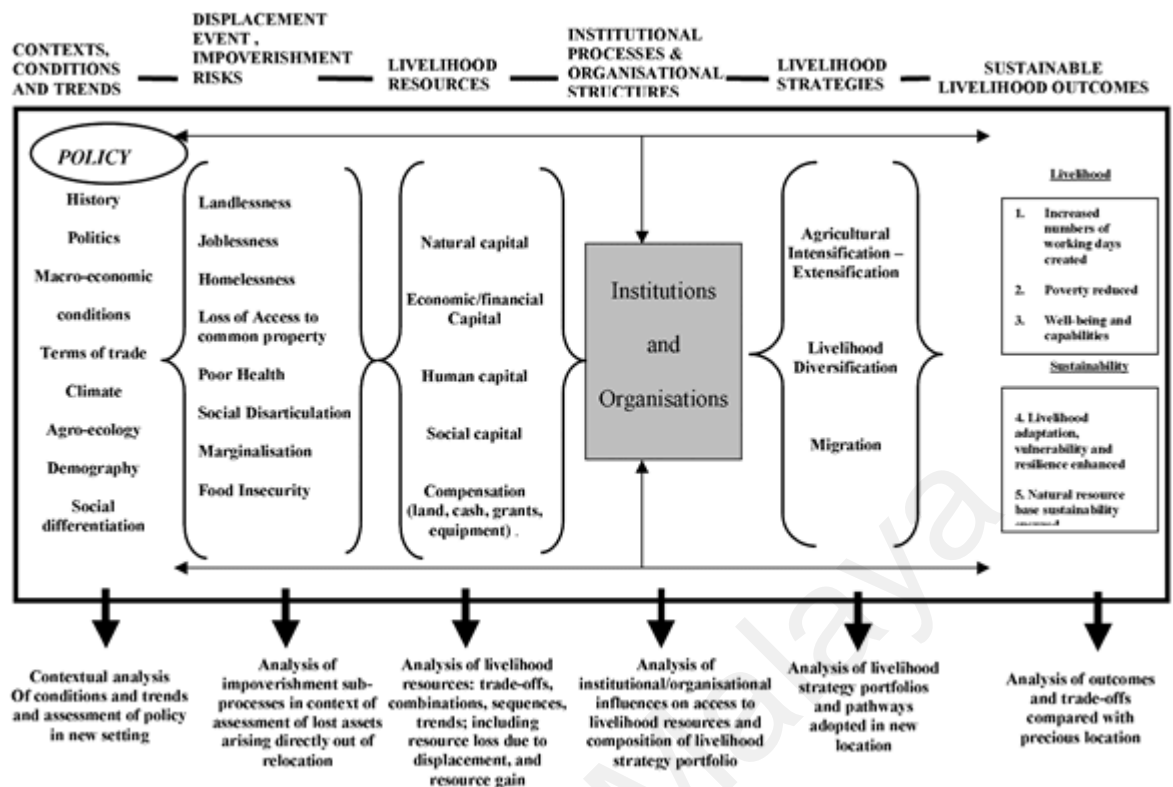


Figure 2. 4: IDS Sustainable Livelihood Framework

(Source: Scoones, 1998)

Migration is the third category; a population which has migrated may increase the level of agriculture intensification when the migrant reverts to the same industry. It may also help to support the expenses of those in their household who have not migrated.

A combination of all three categories is common for the rural people and in this research, the combination practiced by the studied population will be revealed.

For the purpose of this research, both the DFID and IDS sustainable livelihoods framework were used as the basis to kick start the research process. A combination of both is deemed to be necessary for the following reasons: (1) the main objective of this research is to explore the factors affecting livelihood strategies, hence the suggested questions generated by DFID is needed as the basis in generating guided questions for

qualitative data collection, (2) IDS's group of livelihood strategies allowed this research to be analysed based on two dependent variables, i.e. livelihood intensification and livelihood diversification (reasons for migration to be omitted are discussed in the Chapter 3).

2.4 Examples of Past Research

Countless studies about sustainable livelihoods studies have been carried out in the past, which include the following research done recently. These past researches are presented based on the following sequence, (1) trend of fishing income and output, (2) coping strategies, (3) livelihood strategies, (4) factors affecting choice of livelihood strategies, and (5) sustainable livelihoods among poorer group. This is being organized in such a way so as to reflect the conceptual framework of this study.

2.4.1 Past Research on Trend of Fishing Income and Output

According to the Food and Agriculture Organization (FAO) of the United Nations (UN), even though statistics of 2016 showed that aquaculture output had contributed to more than half of the world's fishery output, small-scale fisheries provided work to 90 percent of the job opportunities of fisheries sector in the world (Food and Agriculture Organization, 2016). In the same report, it showed that while the world showed an unstable marine fishery output from years 2003 to 2009, but from year 2010 onwards, thirteen out of twenty-five major fishing countries in the world showed an increase in fishing output. However, Malaysia's marine fishery output showed an increase in total output until year 2013, but decreased after year 2013.

Besides that, as fishery output is an important source of protein, demand for it will still remain high, as reflected in the International Model for Policy Analysis of Agricultural Commodities and Trade which projects fishery output supply, demand and trade of year 2020. Therefore, with the increase in the population size, demand for fishery output will result in upward pressure on fish prices which makes it expensive for the consumers to purchase, and the only way to solve this issue is to expand the aquaculture sector while managing the price of fishmeal (Delgado, Wada, Rosegrant, Meijer, & Ahmed, 2003). On the same note, it is important to realize that marine fishing activities have a long history of polluting the environment or if not, reduce the sustainability level of the natural resources. This has been contributed by overfishing activities, exploitation of fish stocks, blast fishing and even poison fishing (Delgado et al., 2003). On top of that the Tenth Malaysian Plan (2011-2015) had introduced various policies to develop the aquaculture sector (The Economic Planning Unit, 2010). These scenarios further magnified the need of aquaculture in response to the reverse trend of income generated and output achieved by the coastal fishermen, i.e. the need of livelihood strategies portfolio to curb the problem of reverse trend in fishing output and income.

Therefore, by carrying out this research, the researcher is able to provide a guideline for the authority in development planning of improving the country's gross domestic product, and at the same time protecting the livelihood of the coastal fishermen.

2.4.2 Past Research on Coping Strategies

There has been a long history on studies done with regards to coping strategies among the poor. For example, studies on coping strategies among the homeless with formal and informal source of income had been actively done since year 2002 (Ferguson, Xie & Glynn, 2012; Gaetz & O'Grady, 2002). Kidd and Carroll (2007) had particularly

identified four main dimensions of coping strategies through their exploratory studies, i.e. problem focused coping strategies, avoidant coping strategies, social coping strategies and other ways of coping. As Ferguson, Bender and Thompson (2015) applied these coping scales identified by Kidd and Carroll, they noted that problem-focused coping is the main coping strategies of the homeless, while very few chose avoidant coping strategies or other types of coping strategies available. On top of that, they reported that the choice of coping strategies is highly related to the family upbringing and previous experience (Ferguson et al., 2015).

Another recent research on coping strategies was done on coping strategies employed by low income teachers of West Visayas State University, Philippines. In this research, Frugonga (2015) identified twenty-two coping strategies employed by the teachers and the result showed that “buying only basic foods or things for household” is the most chosen coping strategies among the teachers, followed by taking loans from financial institution, etc. The least chosen coping strategies appeared to be “making children stop going to college temporarily after graduated from high school”. However, Meinardus (2003) noted that this choice depended on the level of income earned by each household, whereby education opportunities for the children of inadequate income family might be affected. These contradictory results are obviously due to the sample characteristics of the study carried out by Frugonga, i.e. teachers, which is the middle-income earner.

A study carried out among Vietnam households between year 2007-2010 on their ability to recover from shock or misfortune revealed that a household’s socio-demographic characteristics did not affect their decision in coping strategies, while their level of physical assets do (Tran, 2015). The majority of the respondents agreed that they will seek for loan from friends or financial institutions or seek for other source of income when they were faced with the condition of having insufficient income. At the same time,

only a low percentage of the respondents chose to deplete the resources available to them or dig into their savings. The scenario was contributed by the fact that the studied community did not have enough savings which could support them in going through hard times. In other words, the choice of strategies had a significant relationship with income level (Tran, 2015).

Lastly, similar research done in Keosenkham, an agricultural production village in Vietnam showed that respondents employed the following coping behaviours in going through financial crisis, (1) continue to use upland farming plots and forests, (2) sell live tocks and (3) harvest wild animals and plants, from the forest and sea. When all these efforts did not bring them the level of income needed, they then relied on remittance from family and friends living in other villages, and subsequently started to find employment opportunities in other industries (Kura, Joffre, Laplante & Sengvilaykham, 2017). However, the majority of these coping strategies have depleted the farmer's financial and natural resources, which might ultimately reduce their livelihood outcomes.

In conclusion, there are broad choices of coping strategies, depending on each community and the kind of resources available to them. Detailed study on coping strategies employed is needed from one community to another as again, it cannot be generalized. This research can therefore fill up the knowledge gap in understanding the Malaysian coastal fishermen context.

In terms of the relationship between coping strategies and the choice of livelihood strategies, Oluwatayo (2009) and the World Bank (2009) suggested that a good combination of livelihood strategies can increase household income, which in turn worked as coping strategies in facing crisis, enhancing consumption and also easing the burden of households to sustain basic needs. However, a research done in the Malaysian context on livelihood strategies and income opportunities of the rural poor households in

Kedah revealed that most of the respondents were spending most of their time focusing on ensuring staple food on the table, hence hardly looking into any other possible choice of livelihood strategies (Hassan, Yusof, & Abdullah, 2016). In other words, due to a lack of income, they had to focus on managing their expenses, which had hindered them from looking into more external opportunities or more sources of income. Hence, it is important to look into how coping strategies available affects the coastal fishermen's choice of livelihood strategies.

2.4.3 Past Research on Livelihood Strategies

According to Peng, Zheng, Robinson, Li and Wang (2017) in their studies among the China's local farmers, livelihood strategies can be grouped into three categories, i.e. farming, local off-farm and labour-migrant. This is in line with the IDS Sustainable Livelihood Framework by Scoones (1998), i.e. there are three types of livelihood strategies, which includes agricultural intensification, livelihood diversification and migration. Peng et al. (2017) presented in their report that farming households had the lowest livelihood capitals, besides natural capital, as compared to local off-farm and labour migrant, which resulted in the local off-farm and labour migrant community to achieve a better livelihood status.

Past research on the three types of livelihoods strategies is presented in the following sub-sections.

2.4.3.1 Livelihood Intensification

Livelihood intensification may occur as a result of an (a) increase in gross output per unit of input, (b) increase in labour input, (c) increase in the value of output, or (d)

increase in productivity due to changes in technology (Carswell, 1997). In real-life, a combination of all these intensifications is commonly seen. However, there is no one best combination found yet, as it will depend on each case. For livelihood intensification to occur, either or both an increase in demand for output or fall in the availability of natural resources and/or labour resources needs to occur (Carswell, 1997).

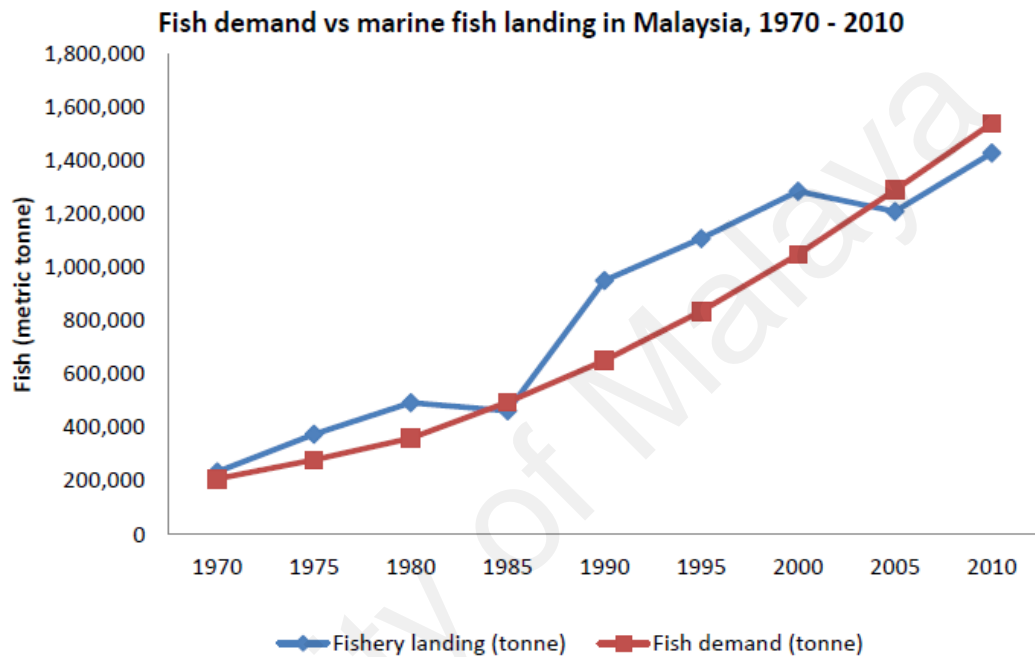


Figure 2. 5: Fish demand vs marine fish landing in Malaysia, 1970-2010

(Source: Teh, 2012)

Demand may increase through population growth, migration or increase in market demand in the country or increased in world demand for the output. Demand for marine fishery output in Malaysia has increased from year 1970 to year 2010 as shown in Figure 2.5 (Teh, 2012). This has resulted in Malaysia being the importer of fishery output, both from marine fishery and aquaculture. This has been worsened by the reality that most of the high-value fish species reared and captured in Malaysia has been exported as a result of high world demand for those fishes (Food and Agriculture Organization, 2009). Therefore, it is clear that fishery livelihood intensification is needed badly in Malaysia,

and Pangkor Island, being one of the major contributors of marine fishery output in Malaysia, will not be able to escape from taking up this responsibility.

On the other hand, natural resources may increase through the right of access to natural resources (through institutions), which will ultimately increase the value of output per input. An increase in labour resources however, may include increase of output per labour, which can be achieved through training, funding and introduction of new methods and technology. It may also be achieved through increase in the number of labour inputs. This is needed as the main capital or asset the fishermen community has is secured in the fishing vessels and gears (Cinner et al., 2013). By increasing the output per labour, higher level of productivity can be achieved, which reduces the cost of the fishing output. However, it is important to note that overreliance on single resource, i.e. coastal fishing alone, may limit the ability of the fishermen community to be flexible and to adapt to changes, and there is always a trade-off of other capital, particularly natural resources, when the fishermen are productive in fishing (Cinner et al., 2013).

Many researchers have classified Southeast Asia fishing livelihood as one that is experiencing capital intensification from small-scale rural fishing (Eder, 2009; Salayo, Garces, Pido, Viswanathan, Pomeroy, Ahmed, Siason, Seng & Masae, 2008) and therefore, tourism has always been the alternative which the governments of each country will opt for in building the livelihood strategies portfolio of the fisherman community (Fabinyi, 2010). This capital intensification is mainly due to the intensification of aquaculture sector (Pomeroy, Parks & Balboa, 2006; Sheriff, Little & Tantikamton, 2008), overfishing (Sadovy, Donaldson, Graham, McGilvray, Muldoon, Phillips, Smith & Yeeting, 2003), declination of eco-systems and severity of environmental problem (Salayo et al, 2008). In other words, bigger investment is needed to achieve livelihood intensification in Southeast Asia and to increase the fishermen's level of adaptability, which includes Pangkor Island.

Therefore, how feasible it is for the coastal fishermen to raise capital needed to re-invest in the industry, to acquire new skills, or to apply skills available in intensifying their livelihood will be studied in this research.

2.4.3.2 Livelihood Diversification

Most studies on small scale fishermen, i.e. mainly coastal fishermen community shows that they are highly natural resources dependence and are one of the main contributors to nature degradation (Allison & Ellis, 2001). They are also frequently being described as the poorest of the poor (Johannes, 1978). Hence, diversification as an alternative is worth exploring when it comes to sustainable livelihood studies.

Livelihoods in many rural households are depending on some combination of agricultural and non-agricultural activities to generate income (Ellis, 2000; Zommers, 2001). Agricultural activities include enterprises producing food and cash crops and various forms of livestock products, whereas non-agricultural income sources include remittances, pensions, family businesses, rent etc (Perz, 2005). In terms of the fishing community, both Smith (1979) and Pomeroy (2016) also suggested a few areas of study which include the development of alternative and supplementary income for fishermen and their households, i.e. diversification to achieve sustainable income. According to Marschke and Berkes (2006), diversification does not benefit fishermen alone, but it acts as a way of overcoming issues in resources fluctuations, seasonality, changes in accessibility, policy, climate, etc.

The pattern of diversification differs from one group of community to another as their goals and motivations for diversification are diverse (Perz, 2005). Some households may diversify out of necessity, i.e. to be able to go through unforeseen crisis (Ellis, 2000), while other households may diversify for a better choice, i.e. to achieve higher goals (Perz,

2005). It can also be different from better off households and poorer households. Better off households will usually diversify to non-farming (non-agricultural) activities while the poorer households might choose to merely diversify to other farming activities, for example from fishing only to fishing and seafood processing sector.

According to Ellis (2000), six specific motivations to diversification might include (a) seasonality, i.e. diversify at time of low season which resulted in low income from agriculture activity, (b) risk management, i.e. diversify to industry that is less affected by agricultural output's price fluctuations, (c) coping mechanisms, i.e. coping with crisis which has caused a loss of income from agricultural activities, (d) labour markets, i.e. opportunity available in other industry which opened doors for diversification, (e) credit market, i.e. to repay loan taken up due to livelihood intensification or other purposes, (f) household assets, i.e. household's livelihood strategies in utilizing assets available to them. The sixth motivation will assist in achieving the other five motivations.

External factors which encourages diversification include conventional management projects. Overfishing, declination of eco-systems and severity of environmental problems as mentioned earlier, has been the basis of livelihood diversification. Conventional management methods assumed that strict rules and regulations will help to manage natural resources and environment, for example, limitation on the catch size or closure of certain fishing ground (Wells, Brandon, & Hannah, 1992). However, this has resulted in fishermen diverting their source of income.

Studies of livelihood strategies of the rural population has shown that roughly 50 percent of rural household income are generated from non-farming activities and from transfers from migrants (Ellis & Freeman, 2004), which is applicable to Asian countries too (Reardon, 1997). A strong positive correlation between the proportion of household

income from the non-farm activities and the household income per capita has been proven in many studies (Barret, Reardon & Webb, 2001; Ellis & Freeman, 2004). Besides, literature review also shows that diversification is important for environment conservation and to achieve economic benefits, i.e. reduces the negative impact of trade-off as mentioned (Allison & Ellis, 2001). In other words, there is a positive relationship between livelihood diversification and livelihood outcome.

2.4.2.3 Migration

Out-migration has significant influence on the household capital as it plays an important role in poverty alleviation by enhancing income in the community of origin (Li, Feldman, Li & Daily, 2011) with the condition that remittance of income to the community of origin occurs.

The actual impact of migration on household income diversification or livelihood intensification can be obvious if the remittance is directly being used to invest in the fishing (agricultural) industry or to fund household expenses.

The first reasons which encourage migration is the difficulty in raising capital needed for livelihood intensification. Fishermen have little financial liquidity and little access to financial institutions (Brauw & Rozelle, 2008). Secondly is the fact that little job opportunity is available to them in other industries in their hometown (Mohapatra, 2006). Therefore, fishermen or their household members may choose to migrate to raise financial capital. The third reason is to be able to overcome the loss or lesser income being generated from the fishing industry due to seasonality, unforeseen risk and crisis (Huang, 1997; Cai, 2000). All these three reasons may contribute to livelihood intensification or diversification. This situation can be seen in many places, including the neighbouring country, Indonesia. At the North Coast of Java, fishermen tend to migrate

from one island to another due to seasonal and spatial variation, which allow them to minimize the impact of climate change (Ruddle, Hviding, & Johannes, 1992).

However, if the community migrated due to a lack of social security or high living costs (Deshingkar, 2006), it might result in permanent migration. Fishermen who migrate permanently to urban areas for the said reason will eventually encourage their entire household to move once they are more settled down. No doubt, this movement will improve livelihood outcomes of the affected households, but it is definitely not a favourable movement from the economic point of view (DFID, 1999).

In conclusion, by understanding the livelihood strategies adopted by the coastal fishermen, and their relationship to sustainable income, i.e. livelihood outcome, will assist the fishermen in understanding what can help them to improve their sustainable income and what cannot. At the same time, it will assist the authorities in finding the best way of achieving the goal in reducing the gap between the rich and the poor.

Next, the factors affecting choice of livelihood strategies discovered in past research will be presented.

2.4.4 Past Research on Factors Affecting Choice of Livelihood Strategies

Past research has revealed various factors affecting the choice of livelihood strategies, of which varies from one community, individual, profession and industry to another.

According to research done by Peng et al (2017), natural and socio-economic factors, effect pathways, livelihood outcomes and policy or management or system are the criteria which affected the choice of livelihood strategies in China. Natural and socio-economic factors identified included geographical location, quality of labour force,

natural capital, household structure and ecological policy. On the other hand, effect pathways include change in livelihood assets, change in household income, energy upgrading, land use change and outmigration. In terms of livelihood outcomes, it includes security, basic material for good life, health and environmental quality. Lastly, policy or management or system include eco-compensation policy, infrastructure construction and educational investment as shown in Figure 2.6. This concept is also in-line with Démurger, Fournier and Yang (2010) who reported on the factors affecting income diversification.

Macusi, Katikiro and Babaran (2017) in their research on the willingness of tuna fishermen in General Santos City, Philippines to leave the fishing sector or to intensify so to improve their livelihood, showed that tuna fishers were reluctant to exit the fishing industry even though tuna catch had reduced by half over the years. In the same research, they identified a few significant factors which resulted in their choice of such livelihood strategies, which included a lack of alternative jobs, long term financial support for their families and children if they were to leave the industry, the ability to negotiate fishing access rights and the ability to explore other fishing area, etc.

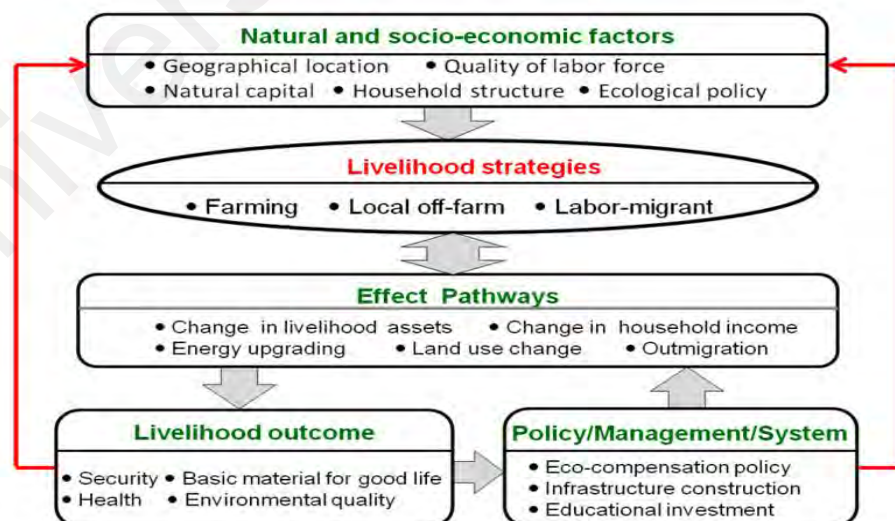


Figure 2. 6: Household Livelihood Strategies and Livelihood Outcomes

(Source: Peng et al., 2017)

However, a research carried out on the female headed household in Ethiopia showed that even though the main source of income of the Ambo District, Ethiopia was generated from agricultural sector, the female headed household tended to engage in diversification of livelihood strategies. The factors that contributed to this choice of livelihood strategies was to broaden and generate additional income to survive and to improve their livelihood, as they did not have enough level of resources endowments to achieve agricultural intensification (Ofolsha & Mansingh, 2014). In other words, this research results shows contradicted the results of the research done in Philippines.

Lastly, another research to take note of is a research carried out in an African country, i.e. Nigeria. In the research, the researchers Matthews-njoku and Nwaogwugwu (2014) identified that cultural factors were the main factors affecting the choice of livelihood strategies of rural households in Southeast Nigeria. The sources of income of these household were mainly from agricultural activities. In the research, the three cultural factors affecting choice of livelihood strategies include high dependency on household head, culture-based inequalities and traditional gender-based property rights. Therefore, the researchers suggested a thorough review on the right of land use, tenancy, other property rights, etc, as this can support the improvement of livelihood strategies and livelihood outcomes.

In conclusion, factors determining livelihood strategies can vary from one community to another, from one industry to another, or even from one household to another. Therefore, detailed research needs to be carried out to understand the studied population. This result will assist the authorities in fiscal planning based on what can be done to encourage the fishermen to intensify or diversify.

2.4.5 Past Research on Sustainable Livelihoods Among Poorer Group

Firstly, Masukujjaman, Siwar, Alam and Halim (2016) carried out research to identify the relationship between social business and sustainable livelihoods of rural households from Bangladesh. In this research, Masukujjaman and the team compared the social business model developed by Prof. Yunus and modified Sustainable Livelihood Framework, i.e. modified from the DFID and CARE Sustainable Livelihood Framework. According to Yunus (2008) “A social business is a non-loss, non-divided company designed to address social problems within the highly regulated marketplace of today”. In other words, it is a non-profit driven company and the aim of setting up this business is mainly to curb social problems. For example, teaching the poorer group to grow vegetables, so that they can be self-sustaining in the long run, instead of providing them merely with subsidies. In the research, Masukujjaman et al. (2016) concluded that there is a direct relationship between social business and the reduction or elimination of the vulnerability level of poorer group.

Secondly, Chavan, Uthappa, Sridhar, Keerthika, Handa, Newaj, Naresh, Dhiraj and Chaturvedi (2016) studied the role of non-timber forest products harvesting, collection and processing in creating sustainable livelihood of vulnerable groups and tribes in Bundelkhand region of central India. In the research, due to climate change, farmers were forced to venture into tree harvesting to ensure a stable income and improved livelihood outcome. For example, Mahua flowers, one of the top five forest produces in India (Chavan et al., 2016) has been an essential source of income for the farmers in Bundelkhand region especially during the summer where water supply is not enough for agriculture activities. With continuous tree harvesting and processing, the researchers presented the positive impact these activities had brought to the community, at the same time, emphasized the role of the authority in allocating market for the tree

output, carrying out appropriate research and development to strike a balance between harvesting and environmental sustainability, i.e. not disturbing the food chain.

Another livelihood research done in India was by Jerry Joseph. His research focused on the fishery industry, whereby he looked into the effect of modernization in the fishery industry on traditional fishermen and boat owners (Joseph, 2015). The research revealed that modernization in the fishery industry included modernization of fishing techniques and introduction of new small boat with higher capacity, which resulted in an increase in total fishery output. All these technologies are important for India as a country just like Malaysia, whereby output from fishery industry is the country's main source of protein and plays a significant role in contributing to the country's GDP. However, Joseph (2015) reported that modernization had encouraged more fishing activities by the boat owners which had affected the sustainability of marine resources, and ultimately livelihood sustainability of the traditional fishermen who depended solely on the sea, particularly coastal fishing area for employment and income. This research once again revealed the need for striking a balance between ways of improving fishery output and sustaining livelihood of small scale or traditional fishermen.

Similar modernization happened in Nha Phu Lagoon, Vietnam. In Vietnam, the introduction of technology and advanced fishing techniques had indeed improved the livelihood intensification level of the coastal fishermen and enhanced their income level and livelihood assets (Nguyen T. H., 2014). However, at the same time, it had caused the poorer fishermen community to be in debt as they took up loans to acquire the technology. As a result, technology had the same impact as it did in India, whereby technology increased the wealth level of fishermen's household if their existing assets allowed them to take advantage of the new technology, while the poorer group were left heavily in debt.

Next, a sustainable livelihoods research was done in the rural area of northern China by Zhong, Blaxland and Zuo (2015). In the research, the trio scrutinized the relationship between income sources, assets available, strategies to overcome risk, and ultimately how these elements contribute to the differences between livelihoods of the rich and the poor. In the research an eye-opening statistic of the poverty group in China was presented, i.e. despite the achievement of China in reducing poverty rates over the years, the poverty rate in China still remained as high as 13.4% in the rural population and about 10% of China's population as a whole. Zhong et al. (2015) concluded that the poverty rate remained high mainly due to a lack of social and economic resources. For example, the better off households had a better social network which allowed them to have better access to the government economic support or assistance, while the poorer group did not have such a privilege. Therefore, the research reflected yet again the important role of the local authority to not only make the right assistance available, but also to reach out to the right people who needed it.

In Malaysia, one of the studies on sustainable livelihood was done in year 2016 by Masud and his team among communities on Tioman Island Marine Park, Redang Island Marine Park, and Tinggi Island Marine Park. In this research, they reported that with the introduction of marine park which has resulted in the economic development on all three islands, the community's standard of living had improved in terms of physical and social assets, but not much of improvement was seen in the sense of human, financial and environment assets development (Masud et al., 2016). Hence, it is important to note that there is still room for improvement in terms of hitting a balance between economic development and all rounded improvement in the standard of living, which is important to achieve sustainable livelihood.

Another research done in Malaysia, of which is closely related to this particular research is a research done by Islam et al. (2014) on the traditional fishermen on the east

coast of Peninsular Malaysia, i.e. Terengganu. In that research, the team reported that the government had undertaken an artificial reef development program with the aim of improving the economic condition of the traditional fishermen in the said area. However, the aim has yet to be achieved mainly due to the lack of effectiveness in the process of implementation of rules and regulations, and the expansion of artificial reefs development programs did not seem to be able to meet the rate of increase in the number of fishermen, hence the issue of declining fisheries resources remained unsolved.

Therefore, it is clear that many researches have been done in the past on sustainable livelihood. Each research focuses on different areas, based on what was needed, and ultimately, it was aimed at helping the authority to implement the related development plans effectively.

Next, the researcher will present the different types of livelihood strategies according to Scoones (1998).

2.4.6 Past research on willingness to change

Willingness to make changes to one's occupation or source of income has been an area broadly looked into in past research, mainly in the employment context.

In the context of fishery, factors affecting one's willingness to change, particularly willingness to learn new knowledge, picking up new skills and venturing into new career or job opportunity varies. According to Daw et al (2012), when hypothetical scenario about declining fishing output were presented to the fishermen of various areas, only fishermen who are not exposed to advanced infrastructure or technology are willing to exit fishing activities, while their other counterparts are not willing to do so as there were not many history of existing observed around them, or the advanced infrastructure

available has allowed them to maintain, or even increase fishing catch and to enjoy better market access. In other words, they cannot imagine or are not able to plan for the worse just yet. Hence, it is not necessary that assets available may encourage fishermen to intensify or diversify.

The next example of past research on this area is a research done in year 1985, whereby the respondents were a municipal organization in the southwest of the United States. In the research, the researcher identified that willingness to make a change in the respondents' occupation is contributed by the availability of opportunities, and there is a significant relationship between willingness to change and spouse's work status, salary involved and age factor (Gould & Penley, 1985), and this is contradicting with Daw et al (2012).

Another research was carried out in year 2010 by Otto, Hagemeyer and Dalbert in Eastern and Western Germany, showed that a person with high levels of work satisfaction, strong occupational commitments and work-related worries will be less willing to change (Otto, Dette-Hagemeyer, & Dalbert, 2010). In the said research, the researcher used the following questions to measure willingness to change, i.e. is the respondent willing to move from one organization to another, is changes needed as the current job is too boring, etc. However, in their research they emphasized the fact that age and education background played only a minor role in determining one's willingness to change, but the other factors as measured by Otto et al. (2010) as mentioned earlier in this paragraph played a more significant role. This is contradicting with the research done by other researchers e.g. Gould & Penly (1985). In other words, psychological factors are more crucial than socio-demographic factors in studying one's willingness to change.

A more recent research done on the area of willingness to change identified was on the fishermen's willingness to change fishing gear from an environmentally disruptive

fishing gear, i.e. drag-net to other more environmentally friendly fishing gears. The research was carried out in Zanzibar, Tanzania. In the research, a majority of the respondents agreed that they would be willing make a change in their fishing methods and fishing gears employed if alternative nets were provided, and if the other options can generate sufficient income too. It is interesting to note too from this research that none of the fishermen agreed that they would be willing to change with strict rules and regulations (Wallner-Hahn, Molander, Gallardo, Villasante, Eklöf, Jiddawi, & de la Torre-Castro, 2016). This result is in-line with the results generated by Olwig (2006) discussed in the next paragraph.

Lastly, in some countries, marine conservation projects have discouraged fishing activities based on the assumption that overfishing might affect the eco-system especially in the coastal area. Therefore, alternatives such as tourism industry has been developed to provide more opportunities and livelihood diversification (Brown, 2003; Caribbean Natural Resources Institute, 2005). The conservation projects assumed that fishermen will abandon their fishery activities when the alternative is offered as it increases their livelihood sustainability level. However, many fishermen, including fishermen in Jamaica for example, had rejected the alternatives mainly because they valued the freedom, self-esteem, self-reliance and the relationship they have with the sea more than income sustainability (Pugholm, 2009). Fishing activities is not just an economic activity for the fishermen, but it's a way of life (Olwig, 2006).

In Malaysia, research was done among the traditional fishermen on their willingness to adopt new fishing technology in increasing the level of fishing output and fishery income (Hamzah, Krauss, Shaffril, Suandi, Ismail, & Samah, 2014). The research done was based on the fact the local authority had put in a lot of efforts in encouraging the adaptation of technology, but small-scale fishermen still continued to rely on traditional fishing methods. The four factors affecting the fishermen willingness to

change included prior experience, knowledge, expertise and values and beliefs. However, this research did not present the level of influence each of these factors had on the level of willingness to change in the Malaysian context, or how it affected the choice of livelihood strategies.

In conclusion, the understanding of what could encourage the fishermen to learn or to venture, will act as a bridge to help the authorities to identify the best way to encourage the fishermen to improve their livelihood.

2.5 Measurement of Variables

2.5.1 Trends of Income

Income is deemed to be one of the most important factors determining household cost of life (Kuleinenov, 2014). In other words, one's expenses will increase on average when his or her income rises. Kuleinenov (2014) reported that one will accumulate all assets or capital available to him in order to increase the level of income. This information was gathered through qualitative data collection approach. However, even though this particular research showed that when income is not enough, the population will choose to raise additional sources of income or sources for credit available, it did not touch on the possible choice of additional income, or if it will lead to intensification or diversification. This information is important for the direction of an economy's development as this decision will affect the source of national income and subsequently the gross domestic product of a country.

2.5.2 Coping Strategy

Savings

According to the Economics Literature of Social Services, there are two advantages of savings, i.e. it helps to overcome uncertainty, and at the same time, accumulate assets for the future. A similar concept with different terms is used in the DFID and IDS Sustainable Livelihood Framework, i.e. overcoming shock and sustainable livelihood outcome. Therefore, there is always an opportunity cost in withdrawing savings available to solve the problem of over budget, i.e. reducing the ability of overcoming shock and reducing livelihood outcomes. Therefore, it will be interesting to find out if this coping strategy is available to the respondent, will it still alert the respondent to improve his livelihood strategies, so as to reduce the impact of its opportunity cost.

Manage expenses

Kuleinenov (2014) examined the possibility of achieving sustainable livelihood through better management of expenses among the urban households in Kazakhstan. In the research, it showed that while it was possible to manage one's own consumption to achieve a balance between income and expenses, it was impossible to regulate market price or fluctuations of inflation rate. In the same research, it revealed that managing expenses, i.e. self-restriction is the most significant coping strategy employed by the lower income group. However, when this coping strategy is available, how will it affect the people's choice of livelihood strategies? For example, when the respondents are able to manage their expenses, will they still intensify or diversify?

External help

External help in this context includes credit from various sources and government grant and subsidies.

Savings involves opportunity costs as do credit. For example, borrowing from financial institutions leads to repayment and interest, borrowing from relatives and friends leads to repayment in terms of money and social repayment. At the same time, it is clear that this form of coping strategy does not lead to a more sustainable income.

With that in mind, it looks like government grants and subsidies are better choices. However, continuous support from the public sector will, in economic terms, result in the scarification of other social welfare and inefficient use of public funds. In other words, this coping strategy is good for the individual but not for the economy as a whole.

On the surface, all three coping strategies seems to be good enough for an individual or household to overcome shock. However, Dercon (2000) noted that developing countries, which includes Malaysia, are prone to high income variability, therefore having external help and savings is not enough to cope with risky incomes, and this can be seen in the inconsistency of consumption, i.e. managing expenses in this case. Moreover, none of these coping strategies are of favorable movement for future development of a country, i.e. it does not contribute to a country's economic growth.

2.5.3 Risk Associated with Fishing Activities

According to Smith (1988), fishermen in many places are aware of their vulnerability, or at least viewed their profession as riskier than any other profession, even when they compare themselves with the fishmongers or processors. The risk carried by fishermen included, but are not limited to the safety of fishermen, rapid growth of market

prices, natural disasters and fish stock condition (Huppert, 1996). These elements provided the researcher with a good guideline in setting up guided questions for open ended interview session.

However, knowing risk alone was not enough, it was not the focus of this research to assess the ways of managing these risks. The researcher was more concerned about how fishermen who were exposed to this high-risk profession made their decision on livelihood strategies.

2.5.4 Livelihood Strategies

There has been a long history in the study of livelihood strategies, and various methods had been used to gather data for this variable. On top of that, various types of studies had been done to discover the relationship between the choice of livelihood strategies and other variables. For example, a recent research was done in Malaysia whereby the researcher applied qualitative data collection and analysis approach to explore information on the respondents and their household consumption patterns and the reason for doing so (Hassan et al., 2016). In the same research, the researchers looked into the type of jobs each respondent took up in supporting their consumption pattern.

On the other hand, back in year 1996, World Bank had categorized livelihood strategies into four main categories, i.e. risk minimizing strategies, crisis management strategies, production maximization strategies and strategies to increase agricultural production (World Bank, 1996). However, in year 1998, when Ellis-Jones and Mason (1999) tried to put these into their study of livelihood strategies of the community in Bolivia, it was not able to represent everything related to the community. Therefore, Ellis-Jones and Mason (1999) decided to adopt exploratory qualitative research approach to identify the relevant information which can explain what livelihood strategies the studied community adopted and how these strategies might affect sustainability of soil and water.

2.5.5 Fishermen's Attitudes Towards Change

In year 1999, a research was done on fishermen's reaction to the introduction of policies to preserve seals, when the existence of seals in the sea affected their fishing output in Greece and England. In other words, the introduction of protection policy might further affect their fishing output. In the said research, the researcher carried out face to face interviews with some guided questions. One of the questions with regards to fishermen's attitudes towards the issue was "What do you think will be the best solution to your problems?". This question has resulted in various response which included financial compensation, restriction to middle size fisheries, etc. (Glain, Kotomatas, & Adamantopoulou, 2001). These results showed that the fishermen might not be ready to make any changes to their livelihood strategies, but expected third parties to find a solution for their problems.

Besides that, another research on the attitudes of indigenous fishermen in Panama on the purpose of marine resource management in improving their livelihood were carried out through qualitative data collection approach as well. However, in this research, relationship was identified between socio cultural type of the respondents, the involvement in decision making of marine resource management, and the respondents' attitudes towards the said management (Hoehn & Thapa, 2009). In other words, the research showed that cultural background of a community was crucial in determining their attitude.

2.5.6 Social Demographic Factors

Quantitative data collection done through survey was adopted by Peng et al. (2017) and the team in finding the relationships between a few social demographic factors and the respondents' choice of livelihood strategies. The research revealed that three (3) social

demographic factors, i.e. geographical location, household size and average education level of household members, had played a significant role in determining the choice of livelihood strategies (Peng et al., 2017). This result is in-line with the research done in Tanzania by Lyatuu and Urassa (2016).

Another research carried out in Lagos, Nigeria one year earlier comparing the differences between genders in coping with displacement as a result of development, i.e. choice of coping strategies. The exploratory qualitative study revealed that the female respondents were better in coping with displacement issues, even though they had to face more displacement challenges as compared to their male counterparts, i.e. domestic violence and sexual assault (Oyefare & Alabi, 2016).

Therefore, in this research, the researcher carried out tests to identify the relationship between various socio-demographic factors and the choice of livelihood strategies.

2.6 Conceptual Framework

To answer the stipulated research questions, and to test the hypotheses, a conceptual framework was developed as shown in to Figure 2.7.

The conceptual framework was developed upon examining the various sustainable livelihood theories, conducting secondary studies and most importantly analyzed the qualitative research findings.

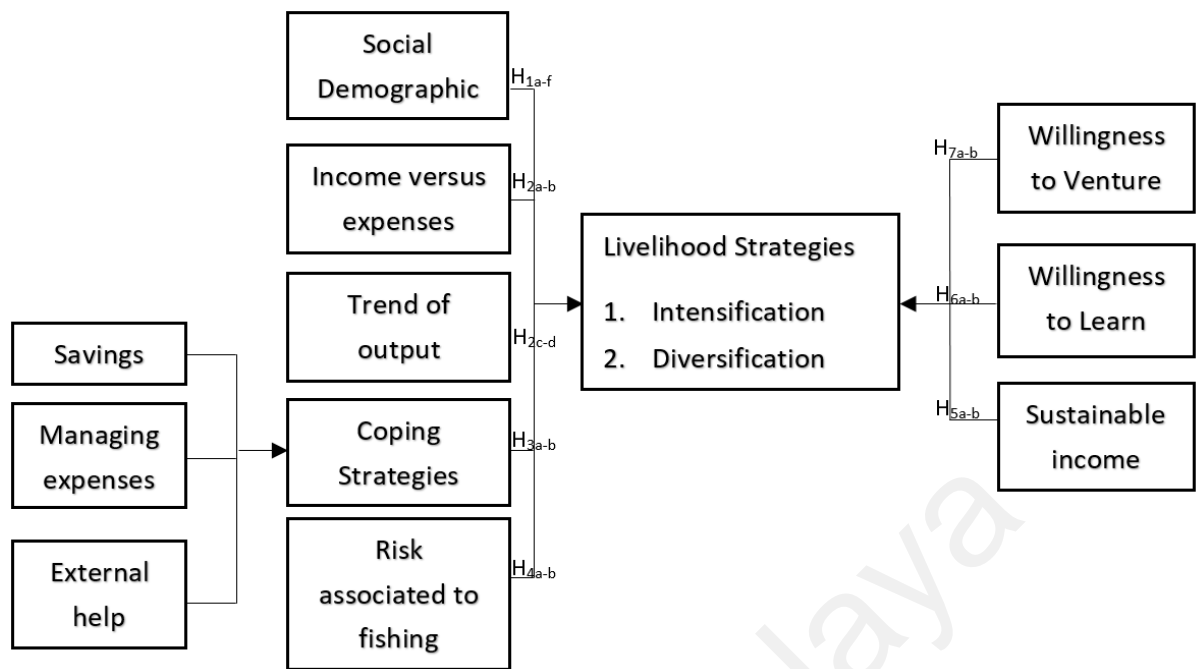


Figure 2. 7: Conceptual Framework (Livelihood Strategies Determinant Framework)

2.7 Research Hypotheses

Fifteen hypotheses were tested based on the conceptual framework, with two livelihood strategies acting as dependent variables while the eight criteria contributing to the choice of livelihood strategies acting as independent variables. Hypothesis 1a to Hypothesis 1f (H_{1a-f}) tested the relationship between the three socio-demographic factors; and the two livelihood strategies, Hypothesis 2a and Hypothesis 2b (H_{2a-b}) tested the relationship between the trend of income and choice of livelihood strategies, Hypothesis 3a and Hypothesis 3b (H_{3a-b}) tested the relationship between coping strategies and choice of livelihood strategies, Hypothesis 4a and Hypothesis 4b (H_{4a-b}) tested the relationship between risk associated to fishing activities to choice of livelihood strategies. The following hypothesis are shown on the right hand side of the conceptual framework, whereby Hypothesis 5a and Hypothesis 5b (H_{5a-b}) tested the relationship between view on sustainable income and livelihood strategies, Hypothesis 6a and Hypothesis 6b (H_{6a-b})

tested the relationship between willingness to learn and choice of livelihood strategies, and lastly Hypothesis 7a and Hypothesis 7b (H_{7a-b}) tested the relationship between willingness to venture and the choice of livelihood strategies. Refer to Table 2.1 for the list of hypotheses.

Table 2. 1: Research Hypotheses

Research objective	Research question	Hypothesis
1	1-3	<p>Hypothesis 1: Socio-demographic factors are significant predictors of the choice of livelihood strategies.</p> <p>Hypothesis 2: There is a significant relationship between trend of income and choice of livelihood strategies</p> <p>Hypothesis 3: There is a significant relationship between coping strategies and livelihood strategies.</p> <p>Hypothesis 4: There is a significant relationship between risk associated with fishing activities and livelihood strategies</p>
2	4	Hypothesis 5: There is a significant relationship between the fishermen's view of sustainable income and their choice of livelihood strategies.
3	5	<p>Hypothesis 6: There is a significant relationship between the fishermen's willingness to learn and their choice of livelihood strategy.</p> <p>Hypothesis 7: There is a significant relationship between the fishermen's willingness to venture and their choice of livelihood strategy.</p>
4	To be achieved through recommendation based on the result of hypotheses testing.	

In the next chapter, the researcher will present the procedure of how this conceptual framework was generated, how these hypotheses were formed and how these hypotheses were tested.

2.8 Summary

The absence of a customized framework to understand the livelihood of the Malaysian fishermen is one of the main motivations for this exploratory sequential research. Therefore, the purpose of this research was to start the study by focusing on one aspect of the sustainable livelihood studies, i.e. livelihood strategies of the coastal fishermen of Pangkor Island. With that in mind, this research commenced by first finding out the criteria affecting the choice of livelihood strategies, before moving on to other research questions.

Through the use of a mixed research method, i.e. in this case, exploratory sequential research approach, this research provided a framework for the criteria affecting the choice of livelihood strategies, the relationship between livelihood strategies and sustainable income, and the effect of willingness to change on the view of sustainable income. Four criteria were identified, which included the differences between income and expenses, coping strategies available, risk associated with fishing activities, and four demographic factors. All these factors appeared to affect the coastal fishermen's choice of livelihood strategies between livelihood intensification and diversification. The third livelihood strategy, migration, as suggested by Scoones (1998) was not included in the framework as it was not applicable to this community.

Furthermore, the researcher identified the patterns of respondents' attitudes towards change and their views of sustainable income. This will be discussed in detail in the subsequent sections.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter discussed the selected methodology in collecting data for this research in order to answer the research questions and achieve the research objectives as stated in Chapter I. Methodology is the procedures of research that are characterized as inductive, emerging and shaped by the researcher's experience in collecting and analysing the data (Creswell, *Qualitative Inquiry and Research Design - Choosing Among Five Approaches*, 2013). The logic that the researcher followed is the ground up process, while using DFID and IDS sustainable livelihood framework as guidance, rather than deductive, which was handed down entirely from a theory or from the perspectives of the researcher. This procedure will contribute to the exploratory nature of the research aimed at understanding the choice of livelihood strategies among the coastal fishermen of Pangkor Island. Eight independent variables were explored through qualitative data collection and analysis approach and tested through quantitative data collection and analysis approach, i.e. Exploratory Sequential Mixed Method Approach.

This chapter first looked at the reason for using exploratory sequential mixed methods research approach, followed by research sample and sampling techniques, i.e. theoretical sampling and snowball sampling.

The next part of this chapter discussed the information needed for this research. A matrix representing the relationship between the research questions, interview and questionnaire survey questions is then presented. This was followed by the research design, which included a step by step discussion of how data will be collected to the process of data analysis. This included the data collection method employed, i.e. one on one interview and questionnaire survey.

Subsequently, the chapter discussed how the researcher managed, organized and analyzed the data in preparation for the findings reports, analysis and interpretations.

This was followed by ethical consideration elements and action taken to address ethical issues as well as the criteria for evaluating the credibility and validity of data collected.

3.2 Research Design

This research starts off with basic literature review to study the contribution of previous researches, identify the knowledge gap and describe how current research can contribute to fill the gap. Research objectives, problem statement, research question and research methodology were then developed (refer Chapter 1).

Next, the researcher started with the first phase of exploratory sequential mixed research method. The researcher developed guided interview questions to be used as the starting point of open-ended interview sessions. Potential research participants were then contacted through telephone; appointments were made with those who were interested to participate in the research. Open ended, in-depth, one-on-one and face-to-face interview sessions were conducted. Data were transcribed, coded and analyzed at the same time as the data collection process. The researcher then decided on which respondent to be called again for further data mining. Thick description was carried out throughout the entire data collection and analysis process.

Triangulation process was carried out to validate and shed light on the researcher's perspective of the data collected, and the theory emerged. This process involved the researcher, an independent party (peer review) and the literature review. This is important to avoid biasness.

After coding, categorizing and triangulation process, the researcher started the second phase of the exploratory sequential mixed methods approach, i.e. to examine those codes and themes and use that information to generate research hypothesis and design the quantitative survey instrument, i.e. semi-structured interview questions with three-point Likert scales. Three-point Likert scales were chosen instead of higher points Likert scales as a majority of the respondents were not well literate and they would have trouble comprehending a five-point Likert scale. This choice is supported by Fang, Fleck, Green, Hao, Tan, Fu and Power (2011) as their research on the intellectually disabled group showed that most items with five-point Likert scale had disordered response options or unequal length of intervals between successive response options, and after removing those deficiencies, it did not decline the validity and reliability in the data of the three-point scales. The instrument was then tested in the pilot study for reliability scores.

The last phase of the process happened when the researcher administered the questionnaire survey to the large sample group. Findings were then put through factorial analysis, SEM analysis and Pearson correlation analysis.

Details of work done in each phase is be discussed in the subsequent sections. However, to help the reader in conceptualizing this process, the research design flow chart is presented below in Figure 3.1.

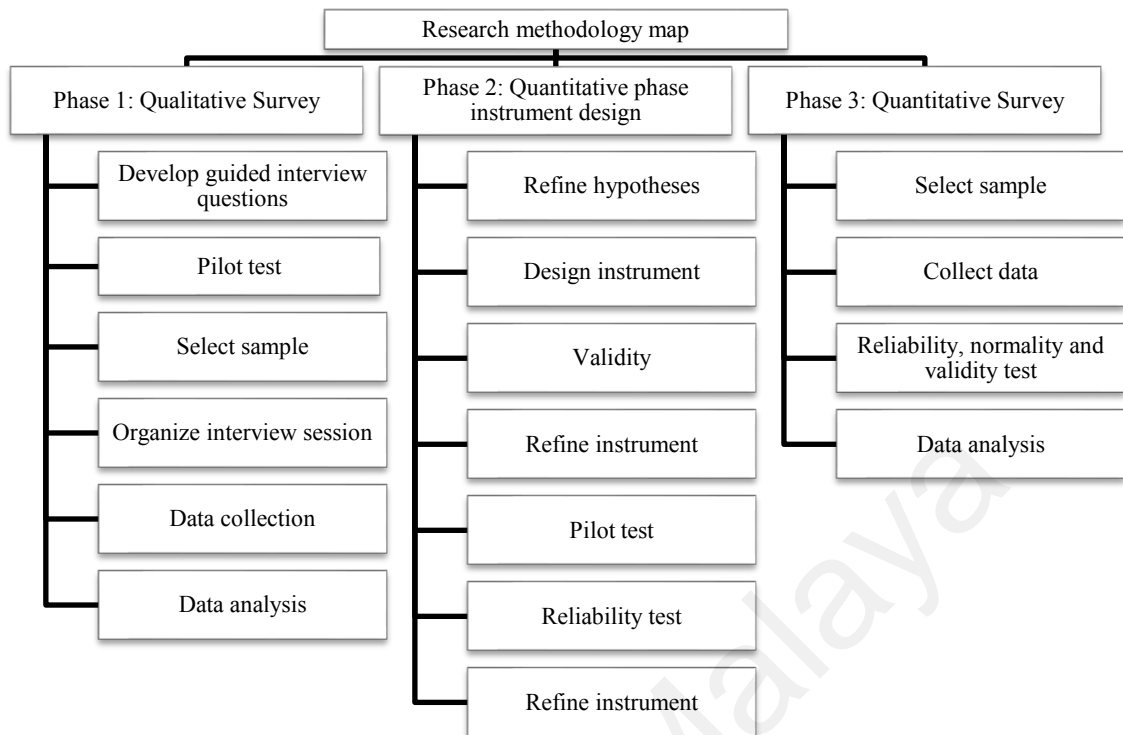


Figure 3. 1: Research Methodology Scheme

3.3 Data Collection Method – Mixed Method

3.3.1 Types of Mixed Method Approach

The initial plan of this research was to employ quantitative research methodology alone, with 5-point Likert scale questions based on semi-structured questions used in past research. However, preliminary and pilot study using the said research tool proved that this methodology was not suitable for the local fishermen community as they were not able to comprehend the complicated 5-point Likert scale-based questions. Throughout the pilot study, the researcher was required to make judgement of the possible choice of answer based on stories shared by the fishermen on every occasion. Realizing that this practice had violated the basic principle of quantitative research and with the approval from both supervisors, the researcher decided to modify her research method to ensure

that the research questions could be answered and the research objectives could be achieved. On top of that, most of the semi-structured questions were based on overseas fishermen community, which was not applicable to the studied population.

Mixed methods research approach is defined by Creswell (2015) as “an approach to research in the social, behavioural, and health sciences in which the investigator gathers both quantitative and qualitative data, integrates the two, and then draws interpretations based on the combined strengths of both sets of data to understand research problems.”

According to Creswell (2015), there are three basic types of mixed methods designs, i.e. convergent design, explanatory sequential design and exploratory sequential design. Convergent design is the extent to which the researcher collects both quantitative and qualitative data concurrently, while the remaining two types of basic mixed methods designs is the extent to which one way of data collection is done before the other. Explanatory sequential design starts with collecting quantitative data, and then use qualitative method to explain the statistics gathered in the first phase. Exploratory sequential design on the other hand starts with qualitative research method to explore a problem, and then build the findings into research instrument for quantitative research method, pilot test the instrument and then followed by quantitative data collection.

3.3.2 Rationale for Choosing Exploratory Sequential Mixed Methods Research Approach

The main reasons for choosing an exploratory sequential design included the following. Firstly, it was important for exploratory purposes. As mentioned earlier, interview questions gathered from literature review were based on different fishermen community, i.e. overseas context, and no research had been done in the past on the targeted community with regards to sustainable income. Therefore, exploring ground

information through semi-structured in-depth interview was crucial. However, it should not stop there, as a small sample size was sufficient to achieve saturation level was not enough to represent a bigger population or to generalize a framework, which was why quantitative research method was then employed to statistically analyse the data collected from the qualitative research method. This was in line with Creswell & Clark (2007), who reported that a mixed research method was able to provide a more complete picture of the study area by recognizing trends and generalization, and at the same time, in-depth knowledge of the respondent's perspectives.

The second reason was triangulation. There are three types of triangulations, i.e. method triangulation, investigator triangulation, and theory triangulation (Carter, Bryant-Lukosius, DiCenso, Blythe & Neville, 2014). Method triangulation involves the use of multiple data collection method for the same research area (Polit, 2011). Investigator triangulation on the other hand is the extent to which more than one investigator or researchers conducting the same research at the same time to provide multiple observation and conclusion (Carter et al., 2014). Lastly, theory triangulation is about the use of more than one theory to interpret and analyse data. For the purpose of this research, method triangulation was applied through the use of exploratory sequential mixed method approach. Constant comparison between data collected and literature review was done throughout the qualitative data collection process (further discussion in the later sections), and diagram / framework generated was validated through quantitative survey method and factor analysis.

The third reason was complementary. In the next section, the researcher presented the characteristics and disadvantages of qualitative research method. The disadvantages can be overcome by the quantitative survey method. Therefore, these two methods were applied together to achieve the research objectives as both methods complement each other. For example, results from qualitative research method could not be generalized in

this case without the assistance of quantitative survey method, while quantitative survey method could not be applied without exploration for in-depth information through qualitative research method.

3.3.3 Examples of Research Using Mixed Method Approach

An extensive review of literature revealed no articles in which mixed methods research had been used to explore a community's livelihood strategies. The following are some examples of research done and methodology employed:

- a. Pomeroy (2016) – In his research on the historical perspective on the changing issues and research and development agendas of small scales fisheries (mainly coastal fisheries) over the five decades, case study methodology was employed. His research revealed various research focus in the past in the case of small scales fisheries, and suggested four research areas for the future researcher, which included (i) Assessment of stock exploited by small-scale fishers; (ii) Development of management tool in minimizing exploitation by small small-scale fishers; (iii) Waste management in distributions channels and re-channelling of its benefits back to small-scale fishers; and (iv) Development of alternatives or supplementary source of income for small-scales fishers. It is good to note that the fourth (iv) suggested areas of research was eventually the focus of this research.
- b. Betcherman and Marschke (2016) – The two researchers conducted research on how Vietnamese coastal fishermen responded to the transition happening in the fishing sector, i.e. the introduction of aquaculture. The methodology employed in this research was face-to-face survey questionnaire targeted at 599 respondents. Their research pointed out that the studied community did not generate lots of

income from the aquaculture activities mainly due to the lack of human and financial capital.

- c. Sulu, Eriksson, Schwarz, Andrew, Orirana, Sukulu, Oeta, Harohau, Sibiti, Toritela, and Beare (2015) – Reuban Sulu and his team carried out research on the livelihoods and fisheries governance in a contemporary Pacific island setting, in particular 12 villages on Solomon Islands. Semi structured interviews, i.e. questionnaire was conducted on 235 households and various regression analysis were carried out. Their research showed that livelihoods were determined by opportunities available and the two biggest challenges of achieving sustainable livelihoods were imperative for food and income as well as the weakening traditional management systems.
- d. Solaymani and Kari (2014) – These two researchers carried out research to evaluate the poverty level of the Malaysian fishery community through face-to-face questionnaire targeted at 2.2% (2,816) of the fishery community throughout Malaysia. The researchers then referred to the multidimensional poverty measurement introduced by Alkire and Foster (2011) to analyse the data collected. As a result, the researchers reported that young fishers and female fishers were often more multi-dimensional poor as compared to other groups.

These examples were relevant to the current research in terms of the characteristics of the populations. However, it is obvious that none of these researches employed mixed methods. Thus, this research appears to be the first attempt to apply mixed methods on the relevant research area. The researcher believed that mixing both quantitative and qualitative research methods can improve the reliability, validity, credibility and trustworthiness of the results generated. At the same time, mixed methods

allowed the strength of one method to supplement the weakness of another method (Teddlie & Tashakkori, 2003).

Sequential exploratory design is a two-phase design, whereby it started off with qualitative research followed by quantitative. However, Creswell (2015) had subsequently broke the two phases down to three phases, whereby phase one was about qualitative data collection and analysis, which builds into phase two, i.e. quantitative phase instrument design and finally phase 3 for quantitative data collection and analysis. This design was important as a customized research tool for quantitative research was needed based on the community studied (DFID, 1999) and quantitative research is needed to increase the credibility and trustworthiness of the qualitative findings.

3.4 Phase 1 - Qualitative Data Collection

3.4.1 Background of Qualitative Data Collection Approach

Qualitative research is defined by Denzin & Lincoln (2011) as “the situated activity that locates the observers in the world, whereby it consists of a set of interpretive, material practices that make the world visible. Qualitative researchers turn the world into a series of representations, including field notes, interviews, conversations, photographs, recording and memos to the self.” In other words, qualitative researchers try to make sense of a situation or phenomena by giving meaning to them.

Creswell (2013) expanded the definition by emphasizing the process of research, i.e. procedures of which study is carried out in understanding social or human problems, interpreting and analysing the data. Reports generated by qualitative researcher will represent the voices of participants, reflexivity of the researcher, interpretation of problem, contribution to literature and any call for change. This definition is in line with the

meaning of constructive / interpretive paradigm, where it is used in research with an intention to understand the world of human experience (Cohen & Manion, 1994) and it tends to rely on participants view of the area studied (Creswell, 2013).

Literature reviewed showed that researchers had different views on the characteristics of qualitative research. However, the following characteristics are deemed to be crucial to support the choice of qualitative method in this research. Qualitative research is conducted in a natural setting whereby the respondents are not brought to the lab or away from the site where they experience the issues studied and they do not send out instruments for respondents to complete on their own (LeCompte & Schensul, 1999; Hatch, 2002; Marshall & Rossman, 2010; Bloomberg & Volpe, 2008). This characteristic is important as a qualitative researcher will need to interpret not only what is spoken and written, but facial expression and body language as well, to increase the reliability level of data collected. As sustainable livelihood study is about studying the community, i.e. human being, therefore, unspoken language became as crucial as the spoken and written language.

The second relevant characteristic is the fact that qualitative research methodology is able to present a holistic and complex situation (Hatch, 2002; Marshall & Rossman, 2010). Qualitative research doesn't focus on cause and effect alone, it tries to understand a situation by studying multiple factors, perspectives as well as the interaction between factors to give a better picture of the complex issue (Creswell, 2013). Bloomberg & Volpe (2008) supported this view stating that "it involves the collection and study of a variety of empirical materials that describe routine and problematic moments and meanings in individuals' lives. As mentioned, sustainable livelihood research is a complicated study with no set rules on how the study is to be carried out. Each study is to be tailor made based on the study area and the community involved, which matches the characteristic of qualitative research methodology.

A third important characteristic is that the researcher is the key instrument of the research (Hatch, 2002). Qualitative researchers are not encouraged to employ third party to collect data on his or her behalf, and do not rely on instruments developed by other researchers (Creswell, 2013). This characteristic was crucial for this particular research as the open-ended interview method was employed, whereby questions generated were acted on only as a guide, and only the researcher knew exactly what kind of data was needed. The researcher of this study was looking into understanding the relationship in a complex setting, of which the current sustainable livelihood frameworks, which was formed based on different group of communities, but not be comprehensive enough to work more than just as a guide. Therefore, exploring information to its saturation level was needed to have the holistic understanding on the particular community.

Next, qualitative methodology, as compared to quantitative methodology, has the added advantage of flexibility (Bloomberg & Volpe, 2008). Through quantitative methodology, a set or fix research tool has to be created and no changes is allowed during the data collection process. However, qualitative research tool, for example, interview, involves questions as a guide (Kvale & Brinkmann, 2009), and more questions can be asked throughout the interview session depending on multiple factors. This flexibility is crucial for sustainable livelihood study where exploration of information is needed.

However, qualitative research method has its own weaknesses, for example, it has limited generalizability, only a small sample size is needed to achieve saturation level and it is subjective. Therefore, in the next section, the researcher will be discussing how quantitative method can be used to overcome the limitation of qualitative research approach and helps to extend the initial qualitative exploratory findings and to generalize the findings and framework.

3.4.2 Background of Open-Ended In-Depth Face-To Face Interview

Interview can be known as the conversation between a respondent and the researcher on the study area, in order to answer research question (Warren, 2002). This data collection method is most probably the most commonly used method in social science, particularly qualitative research (Guthrie, 2010). Even though interview can be time consuming, it provides a wide range of flexibility too, i.e. it can be wide in breadth or in-depth, depending on the type of data needed. It consists of different types of typology too, i.e. unstructured, semi structured or structured, which represent the level of control researcher has. The choice would depend on the research objectives, research questions and types of data the researcher would like to collect (Guest, Namey, & Mitchell, 2013).

In-depth interview describes a conversation designed to allow researcher or interviewer to have a deeper understanding of the study area (Guest et al., 2013) and to explore participants' perceptions and beliefs (Creswell, 2007). This is especially important in the grounded theory methodology as early literature review works as a guide only, and theory can only be emerged based on the respondents' response as compared to literature review done in the later stage (Strauss & Corbin, 1990).

Unlike structured interview, open ended interview uses pre-set interview questions as a guide so that information collected from all respondents are comparable with each other. It is flexible as it allows intervening questions so that relevant data can be collected and interview can be carried out smoothly (Guthrie, 2010).

3.4.3 Rationale for Choosing Open Ended In-Depth Face-To-Face Interview

The first reason for choosing in-depth interview is contributed by its features. According to Guest et al. (2013), in-depth interview should have the following features:

- a. In-depth interviews are to be conducted one-on-one. The one-on-one format allows the researcher to focus on the responses given by each respondent, so that the right inductive probe can be applied to draw in-depth data from the respondents. Besides, this research required the respondent to share confidential information such as their source of income, their family expenses and their attitude towards sustainable livelihood or standard of living. All this confidential information might not be able to be drawn out if the interview were to be carried out in the presence of another respondent, and it would therefore result in difficulties in building good rapport with the respondent.
- b. Utilize open-ended questioning. This research required the respondents to explain the causes of their choice of livelihood strategies and their willingness to welcome changes and also their aims and reasons behind those aims. Therefore, substantial open-ended question was needed (Charmaz, Grounded theory: Objectivist and constructivist methods. In N. Denzin, & Y. Lincoln, 2000). However, a few structured questions such as demographic questions, the choice of livelihood strategies, etc. were needed to initiate the conversation and to lead the conversation into the area of interest.
- c. Use of inductive probing to get depth. Inductive probing simply means asking questions based on the respondent's response to the previous questions, and at the same time link to the research questions and objectives. In other words, the researcher will not be restricted by the interview questions prepared, which then allows a smoother flow of conversation. Moreover, not every respondent is able

to answer every single question prepared in the context of the researcher or academic. Therefore, a customized inductive probing was needed.

- d. Look and feel like a conversation. In-depth interview, especially unstructured and semi-structured interview will make respondents feel at ease. When the respondents feel that the interview session is just as per their common day to day conversation, they will be more willing to share valuable information. That information can be more reliable for the researcher of grounded theory.

The second reason for choosing open ended in-depth interview was based on the aim of the research, which was to discover the relationship between livelihood strategies and sustainable income. As mentioned, in-depth interview allows researcher to have deeper understanding of the respondents, and at the same time semi-structured interview questions allowed some data to be profiled and quantify too. As a result, interviews provide a good source of information for developing understanding of the relationship between livelihood strategies and sustainable income.

Lastly, in-depth interviews allow “true and undistorted” (Willig, 2013) information to be generated about the world and how things work. As opposed to structured questions, where ideas of the researcher and literature review were introduced to the respondents and required the respondents to agree or disagree on those ideas, semi-structured questions require data such as “why”, “how”, etc. to be originated from the respondents with some pre-set questions and probing as guidance.

3.4.4 Steps Taken to Carry Out Open Ended In-depth Interview

The literature review showed that some researcher used a fix step by step interview procedures, while others allowed flexibility.

Kvale and Brinkmann (2009) developed seven stages of the interview process, i.e. thematize inquiry, research design, interview, transcribe, analyse data, verify validity, verify reliability of generalization and reporting. These stages covered the entire process of research. Another researcher Rubin and Rubin (2012), had developed another similar set of interview process, but they allowed flexibility in the process, whereby the researcher is allowed to make changes to the question asked, site chosen and even study scope. On the other hand, Creswell (2013) focused on data collection process only.

For the purpose of this dissertation, the researcher had decided adopt Creswell's (2013) interview process as outlined below.

Step	Description
Step 1	Decide on the research questions to be answered through types of interview. For this research, interview is the main data collection methodology, whereby all research questions were answered.
Step 2	Identify interviewees / respondents. This was done based on the theoretical sampling (refer section 3.8.1).
Step 3	Determine the type of interview. Face-to-face open-ended in-depth interview was carried out to collect the data needed. This method allowed the researcher to capture not only the verbal response, but also the facial and other physical expressions too. Creswell's (2013) main concern about this method is that the respondent might be too shy to answer questions. This was not a concern for the researcher as the preliminary

	study itself showed that the respondents were pruned to share their thoughts through story telling.
Step 4	Design interview protocol. This stage involved the development of guided questions, i.e. open-ended questions. These questions were developed based on suggested questions introduced by DFID Sustainable livelihood framework, preliminary study and what the researcher thought could answer the research questions. The researcher had planned to allocate about 30-45 minutes for each interview session. The researcher invested in a good quality audio recorder to record the interview session so as to maintain eye contact and to ensure smooth running of interview session.
Step 5	Pilot testing. As the interview questions were generated from various sources, including the researcher's point of view, pilot testing was carried out to test those questions. Some of the elements the researcher observed during pilot testing was the time allocated, the way each question was asked, data collected based on the questions asked and relevance of each questions. Through pilot testing, Yin (2009) was able to refine data collections plans and lines of questions. The same was achieved during this particular research.
Step 6	Set appointment and decide on interview site. As mentioned, 30 potential respondents were contacted and were briefed on the purpose of the study and 15 responded and accepted the invitation. The main interview site included the respondents' residence, food stalls and net repairing site, at the convenience of the respondents.
Step 7	Upon arrival at the interview site, the researcher spent about five minutes to communicate with the respondents on general topics, i.e. ice breaking.

	<p>These five minutes was worth investing in as it helped the researcher to understand the respondents better, and also allowed the respondents to feel at ease and subsequently to build rapport. Before actual interview session, the researcher explained to the respondents once again the purpose of this study and got the respondents to complete the consent forms after explaining the contents of it. The researcher started using the audio recorder after the ice breaking session and turned it off only when one of the parties was about to leave the site. Before the interview session, the researcher ensured that she said ‘thank you’ to every respondent to show appreciation, and got the respondents’ consent to be called again if more information was needed.</p>
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3.4.5 Pilot Testing Process

Pilot testing was done three weeks before the planned data collection period. Five respondents were chosen using snowballing method, selecting from the list of names provided by the Fishermen Association, of which three agreed to take part. The common problems observed throughout the pilot testing period were as follows:

- a. All three respondents had problems answering questions on “sustainable income” in both Bahasa Malaysia and English, as they were not able to understand or even imagine the meaning of sustainable income. Therefore, the researcher decided to change the term to “taraf hidup dari segi pendapatan”, which meant standard of living in terms of income.
- b. As the researcher targeted those fishermen who had been in the field for more than 5 years, two out of three respondents had been in the industry for more than 50 years, while the third respondent was 27 yrs. The ones with more than 50 years

showed that they have had experience in intensification, but not anymore as they were moving towards retirement. This data might not be useful for the research as they were not willing to share much on how they had done through intensification. Therefore, the researcher decided to be more specific on the characteristics by limiting to respondents with 5 to 49 years of experience.

- c. On the first two interview questions (besides demographic questions), i.e. about income status and sustainable income, proved to be too difficult / sensitive for the respondents to answer as they were not “tuned in” yet, therefore, the researcher decided to change the sequence by pushing these five questions to the end of interview session. These adjustments were done during the third interview session, and it had proven to work well.
- d. The recorder used was not good enough, which resulted in poor quality of recording. This made the transcription work difficult. Therefore, the researcher had to invest in a recorder of better quality.

All the necessary adjustments were done before the actual data collection sessions.

3.4.6 Transcription Process

In this research, all the semi-structured in-depth interview data were fully recorded and transcribed using Microsoft Excel. Transcription work was fully completed by the researcher alone as suggested by Easton, McComish and Greenberg (2000). The main challenge faced in the transcribing process was the language used during the interview sessions, i.e. Bahasa Malaysia. After transcribing all the audio recordings, all transcriptions were translated into English and the researcher has engaged a professional translator and linguist to verify all translations. An example of translation process is shown in Table 3.1 below.

The final translated version and description were recorded into the same platform together with memoing so as to minimize the possibility of losing data, i.e. to clearly record latent data. The researcher spent time going through the transcription from time to time to identify trends of similarity and differences, before emerging the theoretical framework. As the researcher observed the transcription, the researcher realized more data was needed to confirm the trend, this was what brought the researcher back to the respondents for more details.

Table 3. 1: Example of translated transcription

Original transcription	Translated version	Professional comment
<p><i>SH: So sekarang ada boat sendiri dah, huh, baguslah kan. Ok, tadi encik ada kata, sejak encik jadi nelayan sampai sekarang, encik ada lah perubahan daripada zon, daripada dalam ke pantai, selain daripada itu, cara tangkapan ada tak berbeza?</i></p> <p><i>Khairi: kalau nak ikutkan saya ni semua serba boleh, Cuma saya ni, ialah orang tak tau baca kan, susah nak minta kerje lain.</i></p>	<p>SH: So, do you have your own boat now right, that's good. Ok, just now you have mentioned that ever since you became a fisherman till today, you have changed fishing zone, from deep sea to coastal, apart from that, has your fishing method changed?</p> <p>Khairi: actually, I am versatile, but me, I can't read, so it's difficult to get other job.</p>	<p>SH: So, do you have your own boat now right, that's good. Ok, just now you have mentioned that ever since you became a fisherman till today, you have changed fishing zone, from deep sea to coastal, apart from that, has your fishing method changed?</p> <p>Khairi: actually, I am capable of doing many things, but me, I can't read, so it's difficult to get other job.</p>

3.5 Phase 2 - Quantitative Phase instrument design

After the coding and categorizing process, a possible diagram linking all the categories and codes was generated. With that, the researcher then took the following

steps for the second phase of the exploratory sequential mixed methods process. The following are the steps for creating questionnaire adapted from Diem (2004).

Step 1	Decide what to measure. Items to be measured were decided based on the hypotheses generated. The researcher decided to measure the following elements: (1) Effect of trend of income, coping strategies and risk carried by fishermen on choice of livelihood strategies, (2) Effect of livelihood strategies on the respondents' stance on sustainable income, and (3) the relationship between willingness to change and sustainable income
Step 2	Sampling techniques and size (refer to section 3.8.1 to 3.8.2)
Step 3	Consider the audience. As mentioned, a pilot study on open ended interview questions revealed the fact that most of the respondents were not well literate. Besides, most of the respondents were well versed in Bahasa Malaysia, instead of English. Therefore, the questions were worded in Bahasa Malaysia.
Step 4	Choose measurement scale and scoring. The questionnaire was broken down into two sections, i.e. demographic section and source of income. Besides the demographic questions, most of the questions (16/18) were asked in 3-point Likert scale form, 3 questions in multiple choice form, and for each Likert scale questions, and open-ended option was provided, i.e. 'others' for relevant questions.
Step 5	Arrange questions in logical order. Questions were first organized based on categories/variables. Subsequently, minor adjustment was done as the researcher reviewed with fellow researchers, to improve the

	smooth flow of the questionnaire. For example, multiple choice and easy questions were asked first before the Likert-scale based questions.
Step 6	Choose appropriate data collection method. Understanding the education background of most targeted respondents, the researcher decided to collect data by reading the questions and answers to the respondents when needed. Otherwise, the researcher distributed the questionnaire and collected them the following day.
Step 7	Obtain approval from supervisors. The completed questionnaire copies were sent to supervisors for advice. Appropriate changes were made based on few discussion sessions with supervisors.
Step 8	Contact two external parties to validate the research tools developed. Therefore, the researcher consulted Dr. Derek Ong from Sunway University, the expert in quantitative research, and Dr. Louise Teh, a researcher in Fisheries Economic Research Unit in The University of British Columbia. Comments gathered included the clarity of each questions, the relevancy of each item in answering the research question. The research tools were fine-tuned based on the experts' comments.
Step 9	<p>Pilot testing. Pilot testing was carried out by distributing 30 copies of the questionnaire. During the pilot testing stage, the time taken for each survey session were recorded and the challenges faced by the respondents were noted down.</p> <p>Some of the challenges included the following:</p> <ol style="list-style-type: none"> a. Some respondents tend to tell stories which was not related to the survey question, which resulted in extended response time. Therefore, researcher had to spend slightly longer time in the

	<p>introduction stage, explaining to the respondents the purpose and the process of data collection.</p> <p>b. Snowballing sampling technique was not applied as smoothly as the researcher expected. At one point, a respondent introduced his group of fishermen friends to the researcher. However, the researcher was not able to collect individual response from them, as they refused to fill up the questionnaire, but requested the researcher to read out the questions. The main challenge faced then was not about reading the questions, but the group was trying to answer together, or agree with each other's response, which made it impossible for the researcher to record their response.</p> <p>The data collected went through first reliability test. A few sub-questions were removed to improve the test results. This will be discussed in detail in Chapter 5.</p>
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3.5.1 Instruments for Quantitative Survey

Most of the guided questions prepared for open ended interview session in the qualitative data collection (Phase 1) was adopted from suggested questions presented in the DFID Sustainable Livelihood Framework, and the qualitative data was analyzed and findings were presented in the previous chapter. In Phase 2, the questions were recorded, reorganized, and added based on the findings of Phase 1. These questions were employed into a questionnaire-based instrument used in Phase 3.

It is important to note that the DFID Sustainable Livelihood Framework did not provide a complete form of items to be employed in one questionnaire. Moreover, the said framework stated that questions suggested was for reference purposes, the best questions to be adopted in each research will be based on the conditions of each research area (DFID, 1999). Therefore, the questionnaire, made up of two main sections was developed: (1) Personal information (demographic data), and (2) Fisherman source of income. Each section of the questionnaire was structured to capture the relevant data required in answering the research questions presented in Chapter 1:

Section 1: Personal information

This section consisted of twelve items on the general background information of the respondents. These items included the following with the relevant code used in SPSS. In this section, Item 1, 5, and 7 were used to test Hypothesis 1. The remaining were not used for reasons as mentioned in the previous session.

Table 3. 2: Personal Information

No	Item	Code
1	Age	AgeGroup
2	Gender	Gender
3	Marital status	Mar_Sta
4	Race	Race
5	Number of household members	Fly_Mem
6	Number of children at schooling	Chil_Stay
7	Education level	Edu_Lev

8	Level of involvement in fishing activities	Lev_Inv
9	Number of working (fishing) days per month	No_days
10	Years of fishing	Yrs_exp
11	Maximum level of income per month	Max_inc
12	Minimum level of income per month	Min_inc

Section 2: Fisherman source of income

Eighty-nine items were included in this section to measure the choice of strategies made, criteria affecting the choice of strategies, respondents' willingness to change for a better future, and the respondents' view of sustainable income. The eighty-nine items were made up of six subsections as follows:

The questionnaire was designed based on the categories identified through qualitative content analysis. The questionnaire was then further refined by incorporating advice from an expert in quantitative research, Dr. Derek Ong.

a. Subsection 1: Trend of Income

This subsection consisted of two items, (1) Respondents' view of the level of their monthly income as compared to their expenses (*Adakah pendapatan bulanan mencukupi untuk menanggung perbelanjaan keluarga anda?*), and (2) Trend in the level of fishing output over the years (*Apakah perbezaan hasil tangkapan yang anda perhatikan sekarang apabila dibandingkan dengan permulaan kerjaya anda sebagai nelayan?*). Both items were used to test proposed Hypothesis 2.

Table 3. 3: Income Status

No	Item	Code
1	Income versus expenses	F1IE
2	Trend of output	F1O

b. Subsection 2: Coping strategies

Coping strategies consisted of twenty-two items, be divided into four categories. All items were asked under a general question, i.e. how would you overcome the challenges of shortage of monthly income generated from fishing activities? (*Bagaimanakah anda menghadapi masalah ketidacukupan pendapatan bulanan daripada kegiatan penangkapan?*).

In category 1 (Savings), three questions were asked, which included (1) use savings available (*Guna simpanan yang sedia ada*); (2) I have allocated savings for low seasons (*Saya ada simpanan untuk musim kurang hasil tangkapan laut*); (3) I have allocated savings for emergency use (*Saya ada simpanan untuk kecemasan*).

For category 2 (Manage expenses), three items included in the questionnaire were (1) reduce daily expenses (*Kurangkan perbelanjaan harian keluarga*); (2) reduce cost of fishing (*Kurangkan kos activity nelayan*); and (3) postpone bill payment (*Tangguh bayaran bulanan*).

Category 3 (External help) included the following four items, (1) borrow from family / friends on Pangkor Island (*Pinjaman / sumbangan daripada ahli keluarga / kawan yang berada di Pulau Pangkor*); (2) borrow from family / friends outside Pangkor Island (*Pinjaman / sumbangan daripada ahli keluarga / kawan yang berada di luar Pulau*

Pangkor); (3) taking up loan from financial institution (*Pinjaman dana*); and lastly (4) advance payment from buyer (*Pendahuluan daripada pembeli*).

Table 3. 4: Coping Strategies

Category	Item	Code
1	Savings (3 items)	SAV1 to SAV3
2	Manage expenses (3 items)	MEX1 to MEX3
3	External help (4 items)	EH1 to EH4
4	Subsidies / grant (5 items)	EH5 to EH10
5	Reason for not receiving government support (5 items)	No_sup_reasons_a to No_sup_reasons_e

Items found in category one (1) to category three (3) were intended to be used to test the proposed Hypothesis 3, while category four (4) and five (5) were used in discussion as supporting evidence of the type of subsidies or grants received and some possible reasons of not receiving the said support. The three categories were grouped into one variable, i.e. coping strategies, and test were done to explain the relationship between coping strategies and livelihood strategies adopted.

c. Subsection 3: Risk associated to fishermen

This subsection consisted of seven items to identify the risk that fishermen carried through fishing activities at the coastal area. The seven items included, (1) health issues which does not allow me to go to the sea (*Keadaan kesihatan tidak membenarkan saya*

ke laut); (2) poor weather (*cuaca buruk*); (3) no fishing bait (*Tidak ada umpan*); (4) no output (*Tidak ada hasil tangkapan*); (5) No money to repair fishing equipment (*Tidak mampu memperbaiki mesin / alat rosak*); (6) loss of fishing equipment (*Alat penangkapan hilang*); and (7) poor weather causing accident (*Cuaca buruk maka menyebabkan kemalangan*).

All seven items were intended to be used to test the proposed Hypothesis 4. These items were represented by rR1 to rR7 in the SPSS.

d. Subsection 4: Livelihood strategies employed

Data on livelihood strategies were collected from respondents based on the intensification and diversification efforts taken. This subsection therefore consisted of thirty-eight items, which were divided into seven categories.

Items for category 1 and 3 were intended to be employed to test all the hypotheses proposed, while the remaining were used in discussion as supporting information. These two categories were used as two separate dependent variables.

Four items included in category 1 (*Livelihood intensification*), where the respondents were asked about changes they have done in terms of fishing activities included the following, (1) change from one fishing area to many fishing areas (*Satu kawasan penangkapan kepada beberapa kawasan penangkapan*); (2) change from one type of fishing output to various kinds of fishing output (*Satu jenis tangkapan kepada pelbagai jenis tangkapan*); (3) change from one fishing method to various kinds of fishing methods (*Satu cara tangkapan kepada pelbagai cara tangkapan*); and (4) change from working for others to self-employed (*Makan gaji bertukar kepada kerja sendiri*).

Table 3. 5: Livelihood Strategies Employed

Category	Item	Code
1	Livelihood intensification (4 items)	INT1 to INT4
2	Reason for intensification (8 items)	Inten_reason_a to Inten_reason_f
3	Livelihood diversification (4 items)	DIV1 to DIV4
4	Source of side income (7 items)	rSide_Y1 to rSide_Y7
5	Courses or workshop attended (6 items)	Course_att_a to Course_att_f
6	Reason for not taking up courses (4 items)	Course_natt_g to Course_natt_k
7	Effect of courses attended (5 items)	Course_ben_a to Course_ben_b and Course_nben_c to Course_nben_e

As for category 3, which contributed to livelihood diversification, the following questions were asked in the questionnaire, (1) I do have side income (*Saya mempunyai sumber pendapatan daripada kerja sampingan*); (2) Major portion of my income comes from side income (*Sebahagian besar pendapatan saya diperolehi daripada kerja sampingan*); (3) I have fixed source of side income (*Pendapatan yang saya perolehi daripada kerja sampingan adalah tetap*); and lastly (4) I do not have any side income (*Saya tidak mempunyai kerja sampingan*).

e. **Subsection 5: Willingness to change**

Willingness to change (Hypothesis 6 and 7) was intended to be measured through categories one and three while the remaining to be used in the discussion session as supporting information.

Category one (Willingness to learn) consisted of the following four items, (1) I am willing to take up course in the future (*Saya sudi untuk menghadiri kursus di masa akan datang*); (2) I am willing to take up industrial training (*Saya sudi untuk kerja sambil belajar*); (3) I am willing to spend time in upgrading knowledge (*Saya sudi meluangkan masa lapang untuk meningkatkan pengetahuan*); and (4) I do not see the need of upgrading knowledge (*Saya rasa tidak perlu meningkatkan pengetahuan*).

As for category three (Willingness to venture), the following five questions were asked in the questionnaire, (1) I am willing to find new ways of increasing my income (*Saya sudi mencari cara untuk meningkatkan sumber pendapatan*); (2) I will find new source of income if my income is not enough to cover expenses (*Saya akan cari sumber pendapatan baru jika pendapatan saya tidak cukup untuk menampung perbelanjaan*); (3) I am willing to search for fixed side income if I have the chance (*Saya sudi untuk mencari kerja sampingan yang menjana pendapatan tetap jika peluang diberikan*); (4) I am willing to increase the number of working days to increase my level of income (*Saya sudi meningkatkan hari bekerja untuk meningkatkan pendapatan*); and lastly (5) I do not need to increase my level of income (*Saya tidak perlu meningkatkan sumber pendapatan*).

Table 3. 6: Willingness to Change

Category	Item	Code
1	Willingness to learn (4 items)	WL1 to WL4
2	Courses interested (7 items)	rWC1to rWC7
3	Willingness to venture (5 items)	WV1-WV5
4	Industry interested (10 items)	rWC8 to rWC15

f. Subsection 6: Sustainable income

Respondents' view about sustainable income (Hypothesis 5) was intended to be tested through the four (4) items represented by rSI1 to rSI4 in SPSS. The four items included (1) Sustainable income means having extra income in case of emergency (*Kelestarian pendapatan bermaksud lebih pendapatan untuk mengatasi masalah kecemasan*); (2) Sustainable income means extra income to improve standard of living (*Kelestarian pendapatan bermaksud lebih pendapatan diperlukan supaya kami ada peluang untuk meningkatkan taraf hidup*); (3) Sustainable income means having consistent income (*Pendapatan yang lestari bermaksud pendapatan yang lebih konsisten*); and (4) Sustainable income means various sources of income (*Pendapatan yang lestari bermaksud saya perlu mempelbagaikan sumber pendapatan*).

The items used in the LSDF research mainly assessed the important criteria affecting fishermen's choice of livelihood strategies. This was followed by how the choice of strategies might affect or be affected by the fishermen's view of sustainable income, and subsequently, the possibility of willingness to change affecting one's view of sustainable income.

3.6 Phase 3 - Quantitative Data Collection

3.6.1 Rationale for Using Quantitative Data Collection Method

According to Denzin and Lincoln (2000) quantitative research focuses on using scientific or positivist approach to measure the relationship between variables, instead of explaining the process. Quantitative research involves counting and measuring of data and performing the statistical analysis of those numerical data (Smith, 1988). The assumption behind this positivist paradigm is that there is an objective truth in this world which can be explained scientifically. Therefore, the main concern about this research is the reliability and validity of the research tools employed.

Some characteristics of the quantitative research method being able to state the research problem in very specific and set terms. The research needs to include all the independent and dependent variables under investigation, generate objective conclusions, testing of hypothesis and determining the issue of causes and effects. On top of that, quantitative research method is able to draw conclusions for large numbers of population, i.e. generalization.

With those characteristics in mind, the researcher was able to overcome the weaknesses of qualitative research method as mentioned in 3.4.1.

3.6.2 Steps Taken to Collect Quantitative Data

After the reliability test and final fine-tuning of the research tools, the researcher went back to Pangkor Island for actual data collection. The following were the steps taken in quantitative data collection.

Step 1	<p>Select sample. Contacts for the first five respondents were obtained from response during pilot testing phase, and snowballing continued. However, the researcher did request fishermen for possible contacts of different villages so that snowballing will cover the entire island, i.e. to minimize bias. At the same time, the researcher also started a new chain of contacts by waiting for respondents in front of the LKIM office and subsidized petrol station, as those are the places whereby fishermen will often visit. Lastly, the researcher also went from house to house start more chain of contacts.</p>
Step 2	<p>Collect data. This step took the researcher about 3 weeks to collect data from 165 respondents. In other words, the researcher, together with one assistant, collected 10 sets of data per day. Such a long time was spent as most of the respondents requested the researcher and her assistant to read out the questions for them. Besides that, longer time was taken in explaining the purpose of the research as some respondents felt that many interviews had already been carried out by other researchers on various research topics, but nothing much was done to change their livelihood status. For those fishermen who were willing to fill up the questionnaire on their own, questionnaire was given to them and were collected at an agreed time, i.e. one hour later or a day later. The returned questionnaires were then checked for completeness. When there was any incomplete answer, the researcher spent time explaining the questions briefly to them to gain the appropriate response.</p>
Step 3	<p>Reliability, normality and validity test. This is being referred to as data screening process in Chapter 5. Throughout the data screening process, a</p>

	few questions were dropped to improve the reliability and validity of results. This process will be explained in detail in Chapter 5.
Step 4	Data analysis. SEM and Pearson correlation were adopted to test all hypotheses. Details on how each hypothesis were tested is presented later.

3.6.3 Response Scales and Measurement

The selection of the appropriate measurement tools is crucial, as it will affect the reliability and validity of data collected. According to Masrur and Khan (2007), the findings and conclusions drawn from a study will be of little or no value if the data was collected through invalid measurement methods.

Most of the items in this study were measured using a three-point Likert-type scale that ranged from (1) agree to (3) disagree. The reason for employing a three-point Likert-type scale as compared to other options were discussed in Chapter 3. According to Masrur and Khan (2007), some of the reasons why Likert-type scale is widely used are (1) Statements can be easily constructed and understood, (2) Response categories can be easily identified, and (3) Item-wise analysis can be easily performed.

3.6.4 Data Screening

According to Goldring and Berends (2009), data screening is important to critically examine the quality of data. In other words, it has to be done before the data can be used for analysis purposes. Data screening can be tedious but it helps to answer the following questions, (1) Does the data reflect the actual response of the fishermen? (2) Is there any missing data? (3) If there is missing data, is there a pattern to the missing data?

(4) Are there any extreme or unusual responses? and (5) Are the data meeting statistical assumption of any relevant analysis technique? (Goldring & Berends, 2009)

Therefore, in this research, the researcher used SPSS to generate the value of Cronbach's alpha to test the reliability level of the data collected and EFA to test the validity level of the same set of data collected.

3.7 Data Analysis Approaches

3.7.1 Phase 1 - Qualitative – Content analysis

There are various ways of analysing qualitative data, and there is no single right way of analysing these data. The choice of analysing methods depends heavily on the purpose of research (Punch, 2009). which includes, but not limited to, the following:

- a. Content Analysis – Content analysis is a research tool used to determine the presence of certain words or concept within a text (e.g. books, essays, interview transcript, etc). The researcher will then analyse the presence, meanings and relationships of each word and concept identified, and then interpret the message and present it to the audience. In other words, it is an optimal method for describing meaning in communication (Mayring, 2000).
- b. Conversation analysis – “Conversation analysis is an approach to the study of social interaction and talk-in-interaction that, although rooted in the sociological study of everyday life, has exerted significant influence across the humanities and social sciences including linguistics.” (Sidnell, 2016). In other words, this analysis focuses on the verbal and non-verbal conduct of the respondents' everyday life.
- c. Discourse analysis – Discourse analysis can be defined as the analysis of language beyond sentence. Unlike other kind of linguistic analysis where it focuses on the

grammar or structure of sentence, discourse analysis is more interested in the interpretation of sentences as they are placed together.

- d. Grounded theory – a general methodology of analysis linked with data collection that uses a systematically applied set of methods to generate an inductive theory about a substantive area” (Glaser, *Basics of Grounded Theory Analysis: Emergence v Forcing*, 1992). In other words, grounded theory suggests that theory should be emerged inductively from data collected and analyzed (Chesebro & Barisoff, 2007).

Content analysis originated back in the 18th century in Scandinavia (Rosengren, 1981). Later in the 20th century, it was first applied in the United States. This approach is sometimes being described as quantitative analysis of qualitative data (Morgan, 1993). Later in year 1997, it was applied as a method of qualitative data analysis approach (Nandy & Sarvela, 1997). From then on, the used of qualitative data analysis approach has gained wide recognition in the field of research.

Content analysis is “a method to classify written or oral materials into identified categories of similar meanings” (Moretti, 2011). It is also being defined as “a set of techniques for systematic analysis of texts of many kinds, address manifest content, themes and core ideas found in the tests as a primary content” (Mayring, 2010). Holsti (1969) provided a more straightforward definition that “it is any technique for making inferences by systematically and objectively identifying specified characteristics of messages”. A more recent definition was given by Schreier (2012), that it is “a method for systematically describing the meaning of qualitative material”.

Content analysis was first employed in Scandinavia during the 18th century (Rosengren, 1981). Initially, content analysis was used to analyse both quantitative and qualitative data. However, later it was used primarily in analysing quantitative data, and

was then being referred to as an approach to quantitatively analysing qualitative data (Morgan, 1993). In year 1983, qualitative content analysis was introduced by a German psychologist as a set of techniques for the systematic analysis of text (Mayring, 2000). Qualitative content analysis does not merely focus on words or text, but the themes and core ideas found in the text. Mayring (2000) defined qualitative content analysis as “an approach of empirical, methodological controlled analysis of texts within their context of communication, following content analytical rules and step by step models, without rash quantification”. According to Hsieh and Shannon (2005), there are three main types of qualitative content analysis which includes the following:

- a. Conventional content analysis – This type of qualitative content analysis is aimed at describing a phenomenon. Researchers who employed this analysis method will try to avoid using existing categories (Kondracki, Wellman, & Amundson, 2002), but allow categories to emerge from the data collected.
- b. Directed content analysis – This type of content analysis is aimed at validating or extending conceptually an existing theory. Existing theory will therefore work as a reference in formulating the research questions and research tools. In terms of the coding process, the researcher may choose one of the following two strategies. Firstly, begin coding by referring to the existing theory, i.e. pre-determined code. Secondly, the researcher may start coding after reading the transcript, followed by organizing data using pre-determined codes and categories. If any of the information found in the transcript is not able to fit into the existing categories, a new category or sub category will be created (Hsieh & Shannon, 2005). This way of analysing data was referred to as a deductive category application (Mayring, 2000). The main advantage of employing directed content analysis is that it helps the researcher to stay away from starting a research with a naïve perspective (Hsieh & Shannon, 2005). However, it may result in the researcher focusing on

finding evidence to support the existing theory and so the result may be strongly biased.

- c. Summative content analysis – This analysis focusses on the underlying meaning of words or content of the text (Morse & Field, 1995). This approach begins with the counting of the number of times each word occurred without giving meaning to it and then starts interpreting the content (Holsti, 1969). The advantage of using this method is that it gives an insight into how words are being used. However, it may be limited by its inattention to the broader meanings present in the data (Hsieh & Shannon, 2005).

3.7.1.1 Rationale for Choosing Content Analysis

In this research, Mayring's concept of qualitative content analysis was applied. In the 1980s, Mayring's qualitative content analysis was introduced in the study of psychosocial consequences of unemployment (Mayring, 2000). The said research was done through six-hundred open-ended interviews consisting twenty thousand pages of transcript (Mayring, 2000). This approach was introduced to overcome the weaknesses of quantitative content analysis approach of which the richness of data is lost through the data analysis process of turning qualitative data into quantitative format or statistics (Mayring, 2000). Therefore, in understanding coastal fishermen, whereby story telling through open ended interview sessions was a way which the fishermen felt more comfortable with in sharing information, the richness of data obtained from them might be missing. These data were deemed important as it will assist the researcher in understanding the meaning of social reality, and be used to further explained the quantitative result, i.e. reasons behind each correlation between variables.

Secondly, qualitative content analysis is a strictly controlled methodology, Titscher and Jenner (2000) described this as “the core and central tool of any content analysis is it’s a system of categories: every unit of analysis must be coded, that is to say, allocated to one or more categories. Categories are understood as the more or less operational definitions of variables”. Even though a systematic coding process is applied in grounded theory as well, the ultimate goal of grounded theory is to generate theory, but the aim of this particular research is to identify the criteria affecting the choice of livelihood strategies, and ultimately sustainable income. Therefore, all the researcher needed in the first phase of study is to identify categories, and questions to be used in quantitative research tools in phase two.

The third reason for choosing qualitative content analysis as opposed to grounded theory is the fact that many sustainable livelihood frameworks are available in the research field. This research does not intend to generate another livelihood framework, but to fill in the knowledge gap found in the existing livelihood frameworks. As such, this research is meant to identify the criteria affecting the choice of livelihood strategies in a different context, not just based on assets available to the coastal fishermen, as they do not have much significant assets to be converted into livelihood strategies. Therefore, it is more important to find out how to improve their source of income, through livelihood strategies, by understanding what encouraged them to choose the livelihood strategies they were employing. This will ultimately improve the level of sustainable income and the total assets owned.

Therefore, in this research, a combination of directed content analysis and summative content analysis were employed. Transcripts were read through over and over again and word count were done using Microsoft Excel as shown in Figure 3.3. The following is a snapshot of how the word count was done.

No	Question											
23	22											0
23	23	If income is not enough to cover expenses, what do you do?	Dig from savings				1	1	1	1	1	8
24	24		Cut cost					1	1	1	1	9
25	25		Allowance from LKIM				1	1	1		1	5
26	26		borrow from family members 1 friends in Pangkor Island				1	1				4
27	27		Borrow from family members 1 friends out of the island						1			1
28	28		Borrow from Dana									2
29	29		love gift from								1	2

Figure 3. 3: Snapshot of word counting process

Subsequently, these data were coded based on the DFID and IDS Sustainable Livelihood Framework, while new codes were opened for data which were not able to be fitted into those categories.

3.7.1.2 Steps taken in content analysis

The analysis of the qualitative data serves to answer the first research question, i.e. the elements affecting the choice of livelihood strategies and income sustainability. The researcher applied Creswell’s (2013) data analysis spiral in Figure 3.4 below, in analysing the qualitative data.

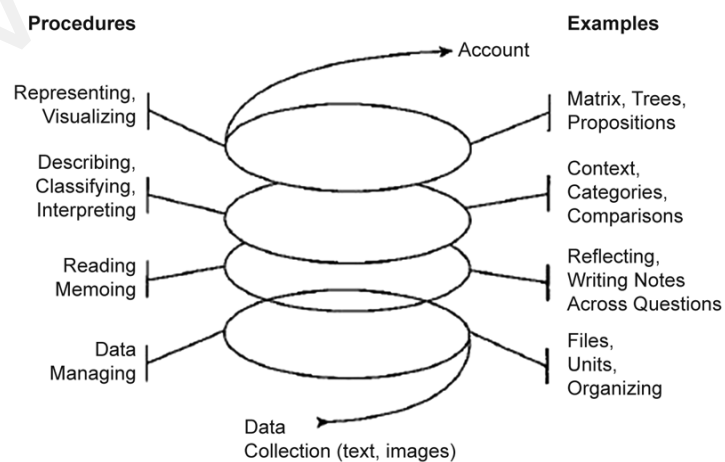


Figure 3. 4: Data Analysis Spiral

(Source: Creswell, 2013)

Step 1	Organizing data. Transcribed data were organized into tables, i.e. demographic table and response table. In the response table, the questions asked were separated from the response to have a better idea of respondents' response only without being restricted by the questions asked.
Step 2	Reading and memoing. The data was read through over and over again to make sense of each conversation. Memo was written on the right margin as the researcher read through those data. These memos assisted the researcher in the subsequent coding process. All 15 interview transcriptions went through the same process.
Step 3	Describing, classifying and interpreting data into codes and categories. The researcher penned down detail description of each interview transcription, which included the location, weather, silences such as "we" instead of "me" and any distractions when the interview was carried out. Then data was classified into codes, i.e. open coding. Codes were then examined to identify whether or not the codes could be categorized (Miles & Huberman, 1994), and if those minor categories formed can be grouped as major categories. After several rounds of revisiting data and memos, the researcher expanded and contracted the number of codes and categories accordingly. The interpretation of data, i.e. making sense of data happened throughout the process of generating the codes and categories.
Step 4	Representing and visualizing data. A table of codes against the responses were created using Microsoft Excel. A tick was put in place when the particular code was mentioned by the respondents. This action assisted the researcher in classifying the importance of each code and category

	according to the number of ticks. Then the data were sorted out based on each column, to identify the similarity. Lastly, themes were converted into diagrams/framework and hypotheses were generated in preparation for the next phase.
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3.7.1.3 Codes and Categories Used

As described, the first phase of the research, i.e. open-ended in-depth face to face interview, was conducted with 15 respondents across Pangkor Island. Guided interview questions were presented in the same chapter as well. Data collected went through the coding process as suggested by Creswell (2013). The following Table 3.7 summarizes the final codes (categories) used.

Table 3. 7: Example codes and categories generated

Categories	Sub-categories	Codes
Income vs Expenses	Enough	YE/Y>E/1
	Somehow enough	YE/Y>E/2
	Not enough	YE/Y<E/1
Strategies to overcome shortages of income	Change livelihood strategies	STR/LIV
	Manage expenses	STR/ME
	Source for external help	STR/SE
Livelihood strategies	Livelihood intensification	STR/LIV/INT
	Livelihood diversification	STR/LIV/DIV
	Migration	STR/LIV/MIG
Short term plan	Savings for low seasons	AS1
	Savings for fixed expenses	AS2
Long term plan	Replace / upgrade fishing equipment	STR/LIV/INT/1
	Savings for future investment	STR/LIV/DIV/1
	Investment	STR/LIV/DIV/2
	Insurance	STR/LIV/DIV/3
	Savings for children education	AS3
	Build / purchase house	AS4
Livelihood intensification	Zone of fishing (from one to more)	STR/LIV/INT/2
	Fishing method (from one to more)	STR/LIV/INT/3
	Fishing output (increase in type of fishing output)	STR/LIV/INT/4
Livelihood diversification	Employment - cleaning	STR/LIV/DIV/4

Categories	Sub-categories	Codes
	Employment – restaurant	STR/LIV/DIV/5
	Employment – hotel	STR/LIV/DIV/6
	Employment – contract	STR/LIV/DIV/7
	Employment – mini market / kiosk	STR/LIV/DIV/8
	Own business – handicraft	STR/LIV/DIV/9
	Own business – restaurant	STR/LIV/DIV/10
	Own business – mini market / kiosk	STR/LIV/DIV/11
	Own business – repair engine	STR/LIV/DIV/12
Migration	Financial inflow	STR/LIV/MIG
Family source of income	Fishing	OTHERS/Y/1
	Employed	OTHERS/Y/2
	Business	OTHERS/Y/3
Risk	Fishing equipment - spoil	RISK1
	Fishing equipment - stolen	RISK2
	Weather – can't carry out fishing activities	RISK3
	Weather – accident	RISK4
	Health condition	RISK5
	No bait	RISK6
	No output	RISK7
Opportunities available	Unused skills - handicraft	OPP/UNS/1
	Unused skills - engine repairing	OPP/UNS/2
	Unused skills - landscape	OPP/UNS/3
	Course attended – fibre glass	OPP/COR/1
	Course attended – engine repairing	OPP/COR/2
	Course attended – agriculture	OPP/COR/3
Reasons for not attending course	Not interested	NOCOURSE/1
	Not being informed	NOCOURSE/2
	Not being selected	NOCOURSE/3
Reasons for not applying unused skills to generate income	Lack of capital	UNSKILL/RES/1
	Lack of appropriate space	UNSKILL/RES/2
	Too basic (not enough to generate income)	UNSKILL/RES/3
Willingness to change	Willing to upskills – aquaculture	WIL/UPSKILL/1
	Willing to upskills – seafood processing	WIL/UPSKILL/2
	Willing to upskills – engine repairing / mechanic	WIL/UPSKILL/3
	Willing to upskills – anything related to fishing	WIL/UPSKILL/4
	Willing to venture – workshop	WIL/UPSKILL/5
Sustainable income	Already satisfied	SI/1
	Financial freedom	SI/2
	Consistent income	SI/3
	Multiple source of income	SI/4
	No idea	SI/5
Sustainable income – future	Will improve	SI/FORECAST/1
	Hopefully improve	SI/FORECAST/2
	Will improve with more resources	SI/FORECAST/3

Categories	Sub-categories	Codes
	Will worsen	SI/FORECAST/4
Opinion for next generation to be fisherman	Part time	OTHERS/F/1
	Hobby	OTHERS/F/2
	No	OTHERS/F/3
	Depend on them	OTHERS/F/4

As seen in Table 3.7, the open ended in-depth face to face interview were coded according to the differences between income and expenses, strategies to overcome shortages of income, type of livelihood strategies (livelihood intensification, livelihood diversification, migration) adopted, ways of managing extra income (short term/long term plan), family source of income, risk carried by fishermen, opportunities available to fishermen to achieve sustainable income, reasons for not attending any courses, reasons for not applying unused skills to generate income, their willingness to change, their view on sustainable income, expectation of sustainable income in the future, and their opinion of having next generation to be a fisherman.

3.7.2 Phase 3 - Quantitative Phase

The challenge throughout data collection and analysis was literally to make sense of the large amount of data collected, screening the data to turn it into useful information, identifying significant patterns between items and variables, and subsequently testing the hypothesis and confirming the conceptual framework. Therefore, the researcher hereby presents the procedures taken in data analysis in Phase 3.

Firstly, the researcher ran reliability test on 30 sets of data collected for pilot testing. Cronbach's alpha value was generated to test the reliability and consistency of each item used in the questionnaire. Alpha was developed by Lee Cronbach in year 1951 (Cronbach, 1951) to provide a measure of the internal consistency of scale employed in

the research tool. The value falls between 0 to 1, which the possibility of negative value if there is a negative covariance among items employed. Cronbach's theory has been supported by many researchers, for example, according to Aron, Coups and Aron (2005), testing internal consistency level is the most efficient way of measuring the reliability level of measurement employed in research tools, and Saraph, Benson and Schroeder (1989) mentioned that the closer the alpha value is to 1, the higher the level of consistency is. Aron et al. (2005) mentioned in their research that a good measure in social and behavioural sciences field should have the Cronbach alpha value of at least .6 or .7, but preferably closer to .9. In this research, pilot data showed an alpha value of (.734). However, it is important to note that consistency does not mean it is valid. This brings the researcher to the second step of data analysis process.

Secondly, the researcher employed the following strategies in testing the validity of research tool at the pilot stage which include firstly select appropriate participants and carefully targeting measurements (Creswell, *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 2007). Participants were selected through snowballing technique. This technique is important as the respondents did not have fixed working hours or even fixed working days, and only their counterpart will have a better idea of where they were at particular period of time. Next, according to Cook and Beckman (2006), a literature review, internet search and discussion with both academic will reveal the evidence of validated survey instrument. Therefore, the researcher consulted Dr. Derek Ong from Sunway University, the expert in quantitative research, and Dr. Louise Teh, a researcher in Fisheries Economic Research Unit in The University of British Columbia. Comments gathered included the clarity of each questions, the relevancy of each items in answering the research question. Lastly, as the researcher conducted pilot test, the researcher recorded the time taken, respondents' response to the

questions asked, and respondents' opinions of the research tools. Through these validity techniques, the researcher managed to do some tuning to the research tool.

Thirdly, another round of reliability test (Cronbach alpha) and validity test (Construct validity) was conducted after actual data collection was carried out. In testing the construct validity, EFA was conducted. EFA is used to uncover complex patterns by exploring the dataset and testing prediction (Child, 1970) and it attempts to discover the simplest way of interpreting complex data (Harman, 1967). EFA is widely used in a wide range of studies, which includes, behavioural studies, medicine, economics, social science, etc. Details of how each assumption of factor analysis was fulfilled is presented in Chapter 5.

Lastly, SEM was employed to confirm the uses of Livelihood Strategies Determinants Framework (LSDF) to represent variables and factors (Yong & Pearce, 2013), i.e. to analyse the structural relationship between the measured and unmeasured variables. This is deemed to be necessary in this research as the LSD Framework is a new framework constructed from this particular research, therefore, the validity of the framework is crucial to improve the validity of the entire research.

3.7.2.1 Rationale for Choosing Structural Equation Modelling (SEM)

Introduction

SEM is the extension of general linear modelling. It allows a researcher to test a set of regression equations. According to Hair, Tatham, Anderson and Black (1998), SEM is a multivariate technique that combines multiple regression analysis, path analysis and factor analysis to estimate a series of interrelated relationships. The Academic Computing and Instructional Technology Services (ACITS) of Texas University of the United States

describes SEM as: “A model which encompasses such diverse statistical techniques as path analysis, confirmatory factor analysis, casual modelling with latent variables, and even analysis of variance and multiple linear regression” (ACITS, 1999). In other words, it can be used to test hypothesized frameworks by looking into how constructs, which are defined by a set of variables, relate to each other (Schumacker & Lomax, 2010). Therefore, it is always being described to be more powerful than other multivariate procedures.

SEM was first introduced by Wright (1921) for genetic studies. The early development of SEM was due to Karl Joreskog (1969), Ward Keesling (1972) and David Wiley (1973). Today, SEM is mostly used in the social sciences, which includes psychology, sociology and marketing, especially in testing hypothesis of causal influences, i.e. the relationship between independent and dependent variables (Snoj, Korda, & Mumel, 2004).

Features of SEM

The most obvious feature of SEM is its ability to facilitate the analysis of relationships between latent and observed variables. Many researchers have explicitly explained the features of SEM, which includes Hair et al. (2010) and Byrne (1998) whereby they provided readers with the differences between SEM and other multivariate techniques.

According to Byrne (1998), there are four basic features of SEM. Firstly, SEM takes Confirmatory Factor Analysis (CFA) to specify the relationship between variables, while other multivariate techniques are more descriptive and will therefore result in more challenges in data analysis, such as EFA. Secondly, SEM provide explicit estimates of error variance parameters, while other multivariate is not capable of doing so. For example, multivariate regression analysis ignores the potential error in all independent

variables, which then jeopardize the outcome of data analysis. Thirdly, as mentioned earlier, SEM incorporate both latent and observed variables, while other multivariate analysis focuses only on the observed variables. Lastly, SEM is capable of modelling multivariate relations, i.e. it is able to estimate the relationship between constructs under study.

A SEM analysis consists of two components, i.e. the measurement model and the structural model. The measurement model is used to identify the relationship between latent variables, observed variables and the measurement errors of each of those variables. According to Anderson and Gerbing (1988) all scales used to define the constructs have to go through the estimation of the measurement model. On the other hand, the structural model will specify the correlational and dependence relationship between the latent variables and between observed variables, i.e. the hypothesized model or framework.

Advantages and disadvantages of SEM

According to Jeon (2015), the most obvious advantage of using SEM is contributed by its main characteristic as discussed earlier, i.e. its ability to capture latent variables and measurement errors, of which other multivariate analysis methods are not able to. Latent variables can be referred to as unobserved variables while the measurement errors referred to any errors due to error in the data input process, errors which occurred as the respondents did not understand the questions or when the respondents were not able to answer the questions. With this function, the results generated through SEM will therefore have a higher level of validity.

Secondly, SEM allows simultaneous estimation. In other statistical tests such as t-test, ANOVA, or multivariate regression, only single relationship between independent and dependent variables can be revealed. For example, ANOVA is able to test the

relationship between multiple independent variables and one dependent variables, while multivariate regression analysis test relationship between multiple independent variables and more than one dependent variables. However, these analyses are not able to test relationship between independent variables. In SEM, however, casual relationships between more than one exogenous variable, i.e. a term used in SEM to represent independent variables, and more than one endogenous variable, i.e. dependent variables; and between endogenous variables can be tested simultaneously.

Lastly, SEM allows the application of multiple statistical analysis method on one model. As mentioned earlier, SEM comprises of two equations, i.e. measurement equations and structural equations. Measurement equations can be done through the CFA while the structural equations through Path Analysis. On top of that, the relationship between exogenous variables can be shown through SEM as well. In other words, with SEM, CFA, Path Analysis and regression analysis can all be done simultaneously.

However, the biggest challenge in implementing the SEM is the amount of background knowledge needed. As mentioned, SEM is a combination of various statistical analysis, and allowed these statistical analyses to be conducted simultaneously. Therefore, a good understanding of regression analysis, factorial analysis and path analysis is crucial. The absence of those knowledge will result in misinterpretation of SEM output.

Besides that, SEM allows various modified models to be constructed. In other words, the same set of data, the same conceptual model, when it is given to different researchers, various kinds of modified model or framework can be generated. This has resulted in SEM being criticized as a poor tool to explain a situation (Jöreskog & Sörbom, 1993).

In this research, the two main disadvantages or limitation of SEM has been overcome through thorough literature review and qualitative findings. Therefore, SEM is deemed to be the most appropriate analysis model to be employed in this research. However, for nominal data, Pearson Correlation Analysis was adopted as SEM does not support those data.

3.7.2.2 Analysis Strategy

Model fit assess the degree to which sample variance-covariance data fit the SEM (Schumacker & Lomax, 2010). Several commonly used criteria were used in assessing model fit which included chi-square (χ^2), the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the root mean square residual index (RMR), root mean square error of approximation (RMSEA), normed fit index (NFI), etc. All these criteria are based on the differences between the original and model implied variance-covariance matrices (Schumacker & Lomax, 2010). In this research, AMOS Graphic was used to generate the values of the said criteria.

Output of most indices include the value of the default model, saturated model and independence model. Default model contains the fit statistics of the model a researcher specifies in the AMOS graphic design, while saturated model contain many parameters estimates as there are available degrees of freedom or input into the analysis, and lastly, independence model contains estimates of the variances of the observed variables only.

In this research, CMIN, RMSEA, NFI, CFI and TLI were adapted to evaluate conceptual framework and to test hypothesis as suggested by (Choi, 2013). CMIN and RMSEA are categorized as the absolute fit indices, while the NFI, CFI, and TLI are the

incremental fit indices. The absolute fit indices will determine how well a model fits the sample data while the incremental fit indices will compare chi-square value to the baseline model (McDonald & Ho, 2002).

Chi-Square (χ^2)

Chi-square value for a model is referred to as the discrepancy function or chi-square goodness of fit. According to Moss (2016), if CMIN is not significant ($P > .05$), it will mean that the observed covariance matrix is similar to the predicted covariance matrix, therefore, the model is regarded to as acceptable. However, the chi-square test is sensitive to sample size, i.e. the larger the sample size, the higher the possibility of having the model being rejected under the chi-square goodness of fit test. Therefore, relative chi-square, i.e. chi-square divided by degree of freedom, is taken into consideration. According to Tabachnick & Fidell (2001), for a sample size of 100-200, relative chi-square value of < 5 is considered to be satisfactory. other goodness of fit test is necessary to further evaluate the conceptual model and to test the null-hypothesis.

Root mean square error of approximation (RMSEA)

Root mean square error of approximation (RMSEA) was first developed by Steiger and Lind (1980) and fully developed later by Browne and Cudeck (1992). Its value is based on chi-square, but it is less sensitive to sample size (Fan, Thompson, & Wang, 1999). In other words, the main purpose of RMSEA is to correct the tendency of chi-square in rejecting model with larger sample size (Hair et al., 2010). As a result, RMSEA will be able to test how well a model can fit into the population besides the sample. Acceptable values of RMSEA varies depending on researchers. For example,

according to MacCallum, Browne and Sugawara (1996), the acceptable value should be between 0.05 to 0.10, Hu and Bentler (1999) stated below 0.60 while Steiger (2007) stated below 0.07. In general, a model with RMSEA below 0.08 is deemed to be a well-fitting model.

Normed-fit index (NFI)

The normed-fit index (NFI) was first introduced by Bentler and Bonnet (1980). This goodness of fit index assesses the model by comparing chi-square value of the model to the chi-square of the null model (Hooper, Coughlan, & Mullen, 2008). NFI value ranges from 0 to 1, and Bentler and Bonnet (1980) suggested that NFI value more than 0.90 will indicate a good fit of model, while Hu and Bentler (1999) later suggested that NFI value of more than or equal to 0.95 will be a better fit. However, NFI is sensitive to sample size, i.e. when sample size is below 200, NFI value may underestimate the fit of model being assessed. Therefore, NFI value should not be used alone. To overcome this weakness, the researcher has then adopted Comparative Fit Index and the Tucker Lewis Index.

Comparative Fit index (CFI)

Comparative Fit index (CFI) is a revised version of NFI by taking into consideration the sample size limitation of NFI. Just like the next index, i.e. the Tucker Lewis Index, CFI was introduced by the co-author of NFI, i.e. Bentler in the year 1990. According to Tabachnick and Fidell (2007) the CFI performs well in both large or small sample sizes. As NFI, and CFI value can fall between 0 to 1.0, and the acceptable value

is also similar to that of NFI, i.e. more than 0.90. This index is being commonly used in SEM due to its strength of accepting lower sample sizes.

Tucker Lewis Index (TLI)

Tucker Lewis Index (TLI) is also known as the non-normed fit index. It was introduced by Bentler, the co-author of NFI to overcome the weakness of NFI, i.e. sample size sensitivity. Due to the nature of non-normed, unlike the NFI, TLI value can be below 0 or above 1.00. Therefore, it could be difficult to be interpreted independently. The satisfactory cutting off value of TLI varies from 0.80 to 0.95, and Hair et al. (2010) summarizes that TLI value of closer to 1 and models with higher TLI value suggests a better fit. In reality, TLI value is similar to CFI value.

3.8 Sampling

One possibility is to collect information from each member of the population. Another way is to collect information a portion of the population by taking a sample of elements from the population, and then generalize the result (Ghauri & Grønhaug, 2005). It is impossible to collect information from everyone in the population due to limited network, time and financial resources. Moreover, sample has been proven to be more accurate than studying everyone in a large population because the latter has greater potential for non-sampling error (Churchill, 1979).

3.8.1 Sampling Technique

The first thing that is needed for all sampling to be effective is to choose the right sampling technique. This is important as it will minimize sampling bias.

In qualitative study generally, sampling is done based on their concepts, their properties, dimensions and variations (Strauss & Corbin, 1990). Therefore, for this study, the researcher had chosen theoretical or theory-based sampling technique for the first phase of research. Like other qualitative research approaches, theoretical sampling technique starts with purposeful sampling. This technique focusses on particular characteristics, based on individual research design, of the population of interest, which will best enable research questions to be answered and research objectives to be achieved.

As the researcher analyzed the data and as the theoretical framework emerged, the researcher will decide on who to collect more data from based on the ability of the respondents to provide more data. This process turned sampling into an evolving process (Glaser & Strauss, 1967).

In the third phase of research, the researcher applied snowballing sampling technique, whereby a few participants were identified in each fishing village and the researcher sought for their assistance to introduce others with similar characteristics. With snowballing sampling technique, the researcher was able to reach out to the unknown. This sampling technique was employed because most of the personal information provided by the fishermen community to the authorities were not up to date, i.e. it is difficult to pick their names from the stored list.

In this study, the researcher's main aim was to generate a framework which will explain the choice of livelihood strategies and how these choices affect the respondents' view on sustainable income, and at the same time how willingness to change might improve or worsen one's view of sustainable income. Therefore, the researcher purposely

chose coastal fisherman of Pangkor Island who had a long history of fishing experience, i.e. 5 years and above. By back tracking, the history of the changes in livelihood strategies employed, the researcher will be able to visualize and explain the said relationship.

3.8.2 Sample Size

One general guideline for sample size in qualitative research is not to limit the study around a few individuals or sizes, but to collect extensive detail about each individual or site studied. This principle is crucial as it is not an intention of qualitative research to generalize the information, but to explore a specific area (Pinnegar & Daynes, 2007). In grounded theory approach Creswell (2013) suggested 20 to 30 individuals to achieve saturation of data. However, this may differ based on each study and it could be much larger (Charmaz, 2006).

For the qualitative phase of the study, the researcher managed to contact 30 respondents through phone, based on the list provided by LKIM of Pangkor Island, and 15 agreed to participate, i.e. 50 percent. For the quantitative phase, based on the Morgan Krejcie and Morgan Table, with the population of 550, sample size of 144 was sufficient, and the researcher managed to collect data from 165 respondents.

3.8.3 Choice of Respondents

As mentioned, the targeted respondents of this research were coastal fishermen of Pangkor Island who fulfil the following criteria:

- a. Carrying out fishing activities mainly within the coastal area of Pangkor Island
- b. Had been a fisherman on the island for more than 5 years.

All fishermen who fulfil the said criteria will stand a chance to be chosen to participate in the research.

3.9 Research Instrument

3.9.1 Qualitative Phase

The three types of information needed in this research included demographic information, perception information and theoretical information.

Demographic information is participant profile information which describe the identity of the respondents (Bloomberg & Volpe, 2008), age, gender, marital status, ethnic group, number of household members, years of fishing, fishing zones, level of involvement in fishing activities and income level. The following Table 3.8 represent the respondents' demographic information collected.

Table 3. 8: Participant Profile

No	Name	Age	Location	Marital Status	Race	Gender	No of household members	No of children (still studying)	Years of fishing	Involvement	Income	Days of fishing per month	Ed Level

Perceptual information refers to participants' perception on the study area. As it is merely perception, they are neither right nor wrong. One's perception cannot be used to generate a theory; therefore, it is important for the researcher to identify the similarity and differences in the perception of all respondents. The following Table 3.9 shows the matrix between research question and open-ended interview questions for Phase 1.

Table 3. 9: Overview of information needed for Phase 1

Research questions	Type if information needed	Interview question number	Method of data collection
1. Sustainable income	1. Have they intensified? 2. What if intensification/no changes are not enough to achieve the targeted livelihood status?	Q7 Q8	Open-ended in-depth interview
	1. Have they diversified? 2. Have their family members diversified?	Q9 Q10	Open-ended in-depth interview
	1. Have migration income assist them in achieving sustainable income?	Q8	Open-ended in-depth interview
	1. Combination of the type of livelihood strategies and how far it is from achieving sustainable income.	Compare Q4, 6, 7,9, 10	Open-ended in-depth interview
2. Criteria affecting choice of livelihood strategies	1. What is their view on sustainable income and what they want to achieve? 2. What is their view on their income status? 3. Is there any difference between current income and their targeted sustainable income? 4. What they have done in working towards achieving the target? 5. How do they perceived their ability to achieve sustainable income in the future?	Q4 Q1, Q2, Q5, Q6 Q3 Q11 Q14	Open-ended in-depth interview
3. Willingness to change	1. Are they willing to make changes to their current livelihood strategies?	Q12	Open-ended in-depth interview

Research questions	Type if information needed	Interview question number	Method of data collection
	1. If opportunity is available, are they willing to try out even though they might not have the skill, knowledge and experience?	Q13	Open-ended in-depth interview

Theoretical information includes information collected from various sources throughout the literature review process. This information is useful in finding the similarity and differences of data collection and the existing theory (Glaser & Strauss, 1967) which will assist in the interpretation and analysis of data. Besides that, theoretical information also supports the methodological approach chosen, identifying research gap, draw conclusion and recommendation (Bloomberg & Volpe, 2008).

However, this information is not enough to generalize the framework/theory generated. Therefore, phase 2 and 3 were carried out.

3.9.2 Quantitative Phase

The following Table 3.5 shows the matrix between research question and quantitative survey questions for Phase 3.

Table 3. 10: Overview of information needed for Phase 3

Research questions	Type if information needed	Interview question number	Method of data collection
1. What are the criteria affecting the choice of livelihood strategies?	<u>Criteria</u> 1. What is the level of expenses as compared to	Q1, Q2, Q3	Quantitative survey

Research questions	Type if information needed	Interview question number	Method of data collection
	<p>expenses? (trend of income)</p> <p>2. How do the respondents overcome problem of insufficient income? (coping strategies)</p> <p>3. What is the risk carried by fishermen?</p>	<p>Q4, Q5, Q6</p> <p>Q17</p>	
2. What is the relationship between choice of livelihood strategies and the expectation of sustainable income?	<p><u>Livelihood strategies</u></p> <p>1. How intensified or diversified are they?</p> <p><u>Sustainable income</u></p> <p>1. What's their opinion on sustainable income?</p>	<p>Q7, Q8, Q9, Q10</p> <p>Q18</p>	Quantitative survey
3. Will the willingness to change affect the expectation of income sustainability?	<p><u>Willing to learn</u></p> <p>1. Are they willing to take up any training courses to improve their ability to gain extra income in the future?</p> <p><u>Willing to venture</u></p> <p>1. Are they willing to venture into other industry or intensify?</p>	<p>Q11, Q12, Q13, Q14</p> <p>Q15, Q16</p>	Quantitative survey

3.10 Ethical Consideration

The interview questions and survey questions (questionnaire) include some personal questions, such as age and job roles. This information is important in the analysis

work. However, some respondents might be upset with these questions and refuse to take part in the survey. According to the Volunteer Rights, the volunteer needs an appropriate knowledge of his/her involvement in the nature of the study prior to the investigation and that the volunteer must have the right to withdraw at any time without prejudice or penalty. During the research, respondents were informed that they were about to take part in an educational survey and that they were free to stop answering question or skip any question as they wished. No ethical approval was needed as this research did not involve high risk or vulnerable people.

In terms of confidentiality, regulation states that the confidentiality of the volunteer must be maintained at all times. Therefore, the volunteers were not asked to state their names or even date of birth to keep them anonymous. On top of that, the questionnaire will not be available for public use. For the purpose of this research, information generated by SPSS, AMOS and analysis made based on the information will be reported but not the individually filled questionnaire to maintain confidentiality.

As for the secondary data, all the idea adapted from any literature will be referenced in respecting their copy right. All the material needed can be found in major libraries across Malaysia, either in hard copy or electronic format. The main reference book, SPSS Survival Manual (Pallant, 2016), which was needed at all times during the analysis stage has been purchased for the purpose of this research.

Issue of trustworthiness of qualitative data

Trustworthiness of research lies mainly on the trustworthiness of the methodology employed. Unlike quantitative research, where set standards are used to test the trustworthiness, such as validity, reliability and generalizability test (Bloomberg & Volpe, 2008), i.e. as it was done in Phase 3 of this research; in qualitative research, it is the

responsibility of the researcher to provide evidence that his descriptions and analysis is trustworthy (Maxwell, 2013). Literature review showed many arguments between scholars on the application of quantitative research trustworthiness test on qualitative research (Fox, Martin, & Green, 2007; Robson, 2002).

This research adopted Lincoln and Guba (1985) who proposed four strategies of testing level of research trustworthiness, i.e. credibility, transferability, dependability and confirmability. This section will describe the application of these four strategies on the current research.

Credibility

Credibility refers to whether the researcher's analysis matches the participants' interpretation and analysis. The following actions were taken in this research on credibility check.

- Saturation – collection of data was on going, and some respondents were contacted again for second round of interview, until the researcher was satisfied that no newer information was available.
- On-going memoing – the researcher ensured that memoing and transcription was done simultaneously within 48 hours after each interview session. Memoing helped the researcher in remembering unspoken language, to avoid loss of important information.
- Triangulation – When the researcher spotted similarity and differences, i.e. pattern, through transcription, the researcher got other colleagues (someone who has never taken part in the research process) to analyse the same and allowed questions to be asked by them (peer review). This helped to minimize the researcher's biasness

due to her background, time limit, perspectives, etc. At the same time, the researcher compared her observation against existing literature. This is important to ensure that connection and theory emerged by the researcher is credible.

- Quantitative phase – This interview method was applied to achieve two objectives. Firstly, it was used to validate analysis reported by the researcher. Secondly, this method allowed the researcher to further confirm findings gained from the qualitative phase.

Transferability

Transferability refers to the relationship between the research context to other context as judged by the later users (Bloomberg & Volpe, 2008) and how much detail it has made available for users to judge the suitability to apply in other context. In this research, the researcher has done the following to improve the transferability of the theory that emerged.

- Thick description – Thick description was introduced by Geertz (1973) to emphasize the importance of systematically documenting and describing what was observed in the research field. As mentioned, the researcher practiced on-going memoing to record detailed information. At the same time, with the help of Microsoft Excel, the researcher was able to compile detailed description about every single interview session. These records will be helpful for other users to understand the rationale behind every single action taken and decision made in emerging the theory.

- Natural setting – No lab or special set up were done during the interview session as it was carried out at the site. This allowed the next user to apply the theory emerged in their own context.

Dependability

Dependability is affected by the ability of the researcher to record the detailed process of data collection and analysis. This strategy is similar to the reliability test applied in the quantitative research.

- Memoing – Besides writing memo on the unspoken language of respondents, the researcher recorded detail of data collection process through the same method as well. As it was impossible to present all raw data collected, some original evidences were presented in the finding chapters to support the connection made between evidences and interpretation.
- Inquiring audit - In the report of findings, the researcher made it clear that later users are welcomed to request data available for review purposes.
- Through triangulation, the third party and existing literature has played a big role in pointing out mistakes found in transcription as well as misinterpretation of transcription by the researcher.

Confirmability

Confirmability refers to the extent to which the findings of the research are recorded and reported based on the respondents' perspectives and not the researcher's

biasness or interest (Lincoln & Guba, 1985). The following was done to check on the confirmability:

- Triangulation – Triangulation outcome required the researcher to reassess the pattern seen by the researcher and to revisit the transcription, code, memo, description over and over again. This has indeed minimized the chances of biasness.
- Audit trail – Audit trail was done through thick description. As suggested by Shenton (2004), audit trail in this research was grouped into two categories, i.e. data oriented and theoretical oriented. For the purpose of data-oriented audit trail, thick description of the process of data collection was helpful. As for theoretical oriented audit trail, thick description made it easier for the researcher to revisit the pattern of similarity or differences of data after each round of triangulation process.

3.11 Summary

This chapter has outlined the researcher's choice of qualitative and quantitative research methodologies, research sample, matrix of information needed and research design. This was followed by in-depth discussion of data collection methods, data analysis process, ethical considerations, and most importantly the issues of trustworthiness and how the researcher increased the level of trustworthiness of the current research. The following chapter presents the contextual findings and explains how the qualitative results derived the conceptual framework representing the relationship between coastal fishermen choice of livelihood strategies and the targeted sustainable income, as well as the position of willingness to change in the framework.

CHAPTER 4 ANALYSIS AND RESEARCH FINDINGS FROM QUALITATIVE STUDY

4.1 Introduction

The previous chapter on research methodology, demonstrated step by step how data was collected and organized, as well as the rationale of selecting exploratory sequential mixed method.

In this chapter, the researcher presents the findings of phase 1 – the qualitative phase, and subsequently, how these responses were used to create instruments for quantitative phase.

4.2 Profile of Respondents in Qualitative Survey

A total of 15 respondents were interviewed. Respondents were coastal fishermen aged between 25 to 49 with at least 5 years of fishing experience. Majority of the respondents are married with only 3 singles. As majority of the coastal fishermen were of the Malay community, hence, majority of respondents were Malays with 2 Chinese and 2 Indians. The occupation is mainly dominated by male as compared to their female counterpart, therefore, 13 out of 15 respondents were male. In terms of income from fishing activities, it varies based on the number of days they go to the sea, level of involvement (i.e. full time or part time basis), etc. Lastly, majority of the respondents (6 out of 15) have completed primary 6, when the rest completed 3 or 5 years of high school education, and only one managed to graduate from college. Refer to Table 4.1 for detail profile of respondents.

Table 4. 1: Participant Demographic Matrix

No	Age	Location	Marital Status	Race	Gender	No of h/h members	No of children	Years of fishing	Involvement	Income		Days of fishing per month	Education Level
										Max	Min		
1	33	Teluk Gedung	Married	Malay	Male	4	2	20	Fulltime	4000	0	Everyday	Primary 6
2	48	Teluk Gedung	Married	Malay	Male	7	5	30	Fulltime	1000	300		
3	49	Teluk Gedung	Married	Malay	Male	9	7	47	Fulltime	1000	500		Primary 6
4	25	Teluk Gedung	Single	Malay	Male	3	1	7	Fulltime	2000	<1000	15 days	Nil
5	60	Teluk Gedung	Married	Malay	Female	9	7	45	Part-time	>1000	>1000	12 days	Primary 6
6	38	Teluk Gedung	Married	Malay	Male	5	1	20	Fulltime	>2000	800	Everyday	College
7	49	Sungai Pinang Besar	Married	Malay	Male	5	3	33	Fulltime	1500	300	10 days	Form 3
8	30	Sungai Pinang Besar	Married	Indian	Male	3	1	15	Fulltime	2000	100	26 days	Primary (not completed)
9	40	Sungai Pinang Besar	Married	Chinese	Male	4	2	25	Fulltime	>1000	>1000	26 days	Primary 6
10	28	Teluk Kecil	Single	Malay	Male	5	0	10	Part-time	1000	200	20 days	Form 5

No	Age	Location	Marital Status	Race	Gender	No of h/h members	No of children	Years of fishing	Involvement	Income		Days of fishing per month	Education Level
11	48	Pekan Pangkor	Married	Chinese	Male	5	3	40	Fulltime	3500	2500	25 days	Primary 6
12	35	Teluk Dalam	Married	Malay	Male	6	4	20	Fulltime	4500	1000	Every-day	Form 3
13	46	Sungai Pinang Besar	Married	Indian	Male	4	2	25	Part-time	2000	1500	15 days	Primary 6
14	47	Sungai Pinang Besar	Married	Malay	Female	7	5	30	Part-time	1000	600	20 days	Primary 3
15	25	Teluk Gedung	Single	Malay	Male	8	0	7	Fulltime	2500	1800	20 days	Form 5

4.3 Major Findings

Eight major findings emerged from this study as follows:

1. All 15 respondents agreed that on average, income generated is not enough, somewhat enough or inconsistent, i.e. none said income is enough to cover expenses.
2. The majority of respondents indicated that they would dig from savings or cut down expenses when income was lower than expenses, instead of finding extra source of income.
3. The majority of respondents had short term plan instead of long-term plan in dealing with extra income.
4. The majority of respondents attempted were still attempting to rely on subsidies.
5. The majority of respondents switched from working for others to operate own *sampan*, while a few changed or multiplied their fishing methods.
6. The majority of respondents indicated that they did not have other sources of income and did not have unused resources to generate extra income.
7. The majority of respondents believed that their livelihood status will worsen, therefore, discouraging their children to be fishermen.
8. The majority of respondents were satisfied or somehow satisfied with their current livelihood outcome.

The narrative format of findings presentation helps readers to understand the depth of respondents' responses. However, to assist the researcher in answering the research questions, and to move on to the second phase of exploratory sequential analysis,

it is important for the researcher to present the findings based on themes generated as shown in Table 4.2.

Table 4. 2: Qualitative findings based on categories

Categories	Findings
Trend of income	Findings 1
Coping strategies (when income is not enough to cover expenses) <ol style="list-style-type: none"> 1. Savings 2. Managing expenses 3. External help 	Findings 2 & 3
Risk carried by fishermen	Findings 4
Livelihood strategies	Findings 5 & 6
Sustainable income	Findings 7 & 8
Willingness to change (Willingness to learn and willingness to venture)	Findings 6

The following is the discussion of the eight findings in detail by the way of “thick description”. Thick description allows the researcher to systematically organize all data through on-going memoing. The emphasis throughout the entire study was to allow the respondents to speak for themselves, which was why open-ended interview sessions were employed. Illustrative quotations are presented in this section to portray multiple perspectives of the respondents.

4.3.1 Trends of Income

Finding 1: All 15 respondents agreed that on average, income generated is not enough, somewhat enough or inconsistent, i.e. none said income is enough to cover expenses.

Income versus expenses was the first criteria identified in the framework generated. This was agreed by the DFID Sustainable Livelihood Framework that sustainable livelihood study doesn't have to start with vulnerability, it can start at any point of the framework or any aspect of livelihood. In this research, the researcher decided to start with this as the responses showed that this is the basis of livelihood strategies and sustainable income.

When comparing the level of income versus expenses at the start of their career as a fisherman and now, all the fishermen still agreed that it was not enough. To make it worse, the majority of them reported that total output had been decreasing over the years. Even though the price of fishing output was determined by the level of demand and supply and their total income had reduced, yet none of them changed their fishing area or strategies due to the market price. Iris (2015) suggested that most Malaysian can't achieve sustainable income due to various reasons, and one of the main reasons was due to expenses growing faster than income. This is in line with the Parkinson's Law which stated that regardless of how much income one earned, with every dollar he or she spent, inflation will still cause their expenses to surpass their income (Parkinson, 1965). Therefore, even though most of the elderly fishermen has changed from working for others which gave them from RM15.00 per month to now between RM300 to RM2000 per month on average, it is still not enough to cover their expenses.

Original	Verified Translated Version
<p><i>Nak kata cukup, memang tak cukup... [Mustapha/1]</i></p>	<p>Want to say enough, but it's not enough...</p>
<p><i>Bergantung kepada pendapatan bulanan tu la, tapi 3 bulan ni memang teruk, itu sebab pakcik kena ambil peluang, keluar jauh sikit, dekat dekat ni takde ikan dah. Kadang kadang ikut boat orang lain, kadang kadang sampan sendiri. [Hanapiah/2]</i></p>	<p>Depending on our monthly income, but three months has been bad, so uncle took the opportunity to find a way out. I went out further to the sea. Sometimes I follow someone else's boat or use my own.</p>
<p><i>sekarang ni pukut mahal, dulu kos pukut dalam rm18, sekarang rm25, dengan gst lagi. Sekarang duit RM1000 untuk perbelanjaan memang tak cukup. RM50 pun kalau beli barang tak dapat apa. Dulu zaman pakcik, belanja rm1 pun boleh, sekarang rm1 dah tak boleh pakai dah, beli milo ais pun tak cukup. [Hanapiah/10]</i></p>	<p>Fishing net is expensive now, it used to be RM18, now it is RM25 before GST. Now RM1000 is not enough for expenses, even RM50 is not enough to buy anything. In my generation, I was able to spend with RM1, but now I can't even buy Milo ice with RM1.</p>
<p><i>oi ada, dulu kurang merosot, sekarang lagi merosot. Dulu pakcik kerje dengan boat besar, tapi sekarang mereka dah ambil pekerja asing banyak, banyak sangat pekerja asing. Kami complaint pun tak boleh jalan. [Hanapiah/14]</i></p>	<p>Oh yes, it (income) has decline significantly. Uncle used to work with big boat, but now they are taking in many foreign workers. We (I) have lodged complaints, but nothing changes.</p>
<p><i>kalau nak katakana cukup tu, boleh la, cukup, tapi kena buat dua tiga macam la. Pergi laut ni, kalau hanya pergi memancing je, tak cukup makan. Kita kena ada dua tiga macam kerje. Macam pagi, kita tarik bubu ketam, sebab benda tu kita boleh budget, kalau yang lebih tu kita pergi pancing, pukut. [Faiza/1]</i></p>	<p>To be honest, it (income) is not enough, so I had to use two three different methods, depending on fishing (fishing rod) alone will not be enough to survive. We (I) need to use few methods. For example, we (I) will pull crab trap, because that activity we (I) can estimate (the outcome), the remaining (time) we (I) go for fishing (fishing rod) or trawl.</p>

Original	Verified Translated Version
<i>boleh la, kais pagi makan pagi la. Pernah juga tak cukup, biasa juga [Halil/1]</i>	ok la, (whatever I find when I) scratch in the morning, (is just enough for me to) eat in the morning. It's quite common not to have enough though.
<i>Kadang-kadang cukup, kadang-kadang tak cukup, nasibla... rezeki ni, kadang-kadang ada, kadang-kadang takde... [Syukur/1]</i>	Sometimes enough, sometimes not enough, depends on luck... it is sustenance, sometimes it is there, sometimes it is not.
<i>Cukup memang cukup, tapi perbelanjaan makin meningkat, kadang-kadang tak cukup juga [Xing/5]</i>	Somehow enough, but living expenses has been increasing, sometimes not enough also.

It is interesting to note that even though all respondents agreed that their income was never enough, only one of the fifteen respondents agreed that they did not have savings, while others agreed that at times they did have extra which they could use for other purposes. Therefore, there is still a need to understand the connection between extra income and livelihood strategies and ultimately sustainable income.

Original	Verified Translated Version
<i>Mana ada simpan langsung? tak tau lah orang lain, mcm saya, ada balance, beli la apa yang patut untuk keluarga. Kira kais pagi makan pagi, kais petang makan petang [Mustapha/7]</i>	No savings at all. I don't know about other people, but for me, when I have any balance (extra income), I will buy what is needed for my family. It's like (whatever I find when I) scratch in the morning, (is just enough for me to) eat in the morning. (whatever I find when I) scratch in the evening, (is just enough for me to) eat in the evening.

<p><i>tak ada, yang lain kalau ada balance RM100 or RM200 semua masuk simpanan untuk anak. [Khairi/42]</i></p>	<p>Don't have, even if I have balance (extra income) of RM100 or RM200, I will save it for my children.</p>
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4.3.2 Coping Strategy

a. Manage Expenses

Finding 2: The majority of respondents indicated that they would dig from savings or cut down expenses when income was lower than expenses, instead of finding extra source of income.

According to the DFID (1999), savings has two important characteristics, (1) savings level of productivity, i.e. what is the value of savings if it is being left untouched; (2) savings level of liquidity, i.e. how long it takes to turn it into cash. Both characteristics are important, and both can be traded off against each other. However, trading off the characteristics of savings may come with certain level of risks. For example, if savings can be easily turned into cash, the productivity (value) level might be compromised. This will result in compromising the long-term sustainable income.

Majority of the respondents agreed that they will dig from their savings when daily income is not enough to cover their expenses. This is the result of inconsistency in daily income of fishing activities. This situation had resulted in 12 out of the 15 respondents agreeing that their savings could last them for less than a month. In other words, they chose to trade-off the productivity of savings for the exchange of liquidity level of savings.

Original	Verified Translated Version
<i>Kami nelayan ni tak boleh menyimpan, bulan ni ada ikan, bulan depan tak ada ikan, kena ambil duit simpanan [Din/2]</i>	We fishermen are not able to save, this month have (managed to catch) fish, next month no fish (not managed to catch anything), so we have to dig from savings.

b. Savings

When they ran out of savings, the next thing they chose to do was to cut down daily expenses, with a majority of them agreeing on cutting down meals on the table and postponing payment, such as utilities, rental or housing loan. Many of them called this arrangement as “financial planning”. Six out of the fifteen of them mentioned that they would get loan from family and friends, or financial institution to cover expenses, and two received the loans. If this persists, the researcher foresee that this group of community may fall into a debt trap.

Original	Verified Translated Version
<i>...Tapi kita pandai bahagi, banyak hutang la, dapat untung lebih bayar la, kira pandai pusing la. Macam duit api air (electricity and water bill), kadang hutang dulu, sebab nak agih pendapatan, anak dah sekolah menengah [Mustapha/1]</i>	We (I) can divide (income), but debts are a lot, when we earn more income, we pay more (instalment). We (I) first need to rotate the payments of electricity and water. Sometimes we (I) owe the debt first, because we (I) want to distribute (manage) our income, kid is in secondary school.
<i>Pinjaman saya sekarang ni dah dua kali, dari yayasan, mula mula saya buat pinjaman 10000 dapat 3000, saya bolehlah dapat beli barang barang peralatan nelayan. Habis tu, dalam masa</i>	I have taken two loans from “Yayasan” (financial institution), the first time I applied RM10,000, and I received RM3,000, not too bad, I managed to purchase some fishing gear. I managed to

Original	Verified Translated Version
<p><i>dua tahun, saya dah settle dah barang tu (loan), saya buat pinjaman kedua, minta 10000, dapat 8000, sekarang ni saya tinggal lagi 2000, tapi 4 bulan gantung, sebab cuaca. Dalam 4 bulan lepas, cuaca teruk, dengan rebut, hujan, tak tentu kan, ikan pun takde... [Khairi/22]</i></p>	<p>settle the loan within next two years. Then I applied another loan worth RM10,000 and I received RM8,000, now I still owe RM2,000, but I have not been paying the monthly instalment for the past 4 months due to poor weather. In the past 4 months, weather has been poor, with thunderstorm and rain, and no fish at all (didn't manage to catch any fish).</p>
<p><i>ya, beli peralatan tu la bagi pinjam, dapat 13000 lebih, dekat 14000. Tu kalau takde ikan, macam mana nak bayar kan, itu sebab diaorang potong daripada elaun sara hidup la. [Hanapiah/15]</i></p>	<p>Yes, borrow to buy fishing gear. I received between RM13,000 to RM14,000. But when there is no catch, how can I pay back? That is why they deduct from (fishermen) living allowance.</p>
<p><i>ah, boleh la, boleh pinjam sikit sikit la untuk cover. Itu pun belum kira kalau peralatan, enjin rosak lagi. It kalau barang barang kita rosak, masa tu memang kita pokai, sebab kos nak baiki engine tu tinggi. [Faiza/5]</i></p>	<p>Still ok, I can borrow a little bit to cover (expenses). But what if the fishing gear spoil? If those equipment spoil, we (I) will be broke, because cost of repairing engine is high.</p>

On top of that, there were a small number of the fishermen who mentioned that they would even refrain from going out to sea when they did not have enough money to purchase diesel or bait, with only one out of fifteen agreeing that sometimes he chose to share the *sampan* with his friend to reduce the cost per trip.

Original	Verified Translated Version
<p><i>kalau hasil tak cukup juga, kita menumpang kawan, sebab minyak tentu dah tersekat dah, minyak tak cukup la nak pergi ke laut tu, tumpang kawan dulu, minyak tu kongsi2 la. Contoh pergi ke laut tu, pergi dengan kawan. So kos tu jadi rm50 la [Syukur/3]</i></p>	<p>If output (income) is not enough, we (I) will hitch a boat ride with friend, because we (I) do not have enough fuel to go to the sea, so we (I) will share fuel cost with friend. For example, when I go to the sea, I go with my friend (in one sampan), so the cost of fishing will be shared to RM50 each.</p>

c. External Help

Finding 3: The majority of respondents attempted and were still attempting to rely on subsidies.

In the case of the coastal fishermen of Pangkor Island, many subsidies and grants have been provided as confirmed by all fifteen respondents. The types of subsidies and grants given or available include:

- a. For fishing activities – subsidized diesel and petrol, monthly allowance for fishermen, sales subsidies based on the weight of fishing output, free boat and engine
- b. For investment – Azam Niaga Kiosks
- c. For housing - repairing and upgrading of houses, subsidized apartments and terrace houses
- d. For upskilling – ongoing free courses which include daily allowances, meals and accommodation
- e. Other forms of aid – Bantuan Rakyat 1Malaysia, e-kasih

Fourteen out of fifteen respondents mentioned that they had been applying for various kinds of funding and subsidies, and they all agreed that they had received at least

one type of subsidy or funding. However, more than half of the respondents mentioned that the reasons for not receiving support was due to suspected practice cronyism. This could be true, as not every funding was distributed through the official channels such as Fishermen's Association or LKIM. Even if it was distributed through these two channels, information was distributed through the committees who represent each village, and names of recipients were submitted through the same channels.

Original	Verified Translated Version
<p><i>Dalam 4 bulan lepas, cuaca teruk, dengan rebut, hujan, tak tentu kan, ikan pun takde, bantuan sekali pun saya tak dapat, walaupun saya ni 11/1A (nelayan tulin), tak pernah dapat satu bantuan pun...Bukan tak pernah minta, berpucuk-pucuk surat, tapi tak pernah dapat [Khairi/22-23]</i></p>	<p>Weather has been poor in the past 4 months, with thunderstorm, rain, its unpredictable. No fish (catch), and never received any (government) assistance, even though I am a pure fisherman under (Fishermen Act) 11/1A. It is not that I have not applied before, many applications have been made, but never got anything.</p>
<p><i>Tapi anak-anak ada juga bantuan sekolah, mykasih lebih kurang rm60 untuk anak anak, tak la susah sangat. Tapi untuk saya tak pernah dapat... pernah (BRIM), setahun 3 kali, ada juga sara nelayan, sebulan 300 [Mustapha/5]</i></p>	<p>My children received education assistance (under mykasih program) of about RM60 (per month), which has ease things up. But I have not got anything personally besides BRIM, 3 times per year and fishermen allowance, RM300 per month.</p>
<p><i>Ya (dapat pinjaman dana), beli peralatan tu la bagi pinjam, dapat 13000 lebih, dekat 14000. Tu kalau takde ikan, macam mana nak bayar kan, itu sebab diaorang potong daripada elaun sara hidup la. [Hanapiah/5]</i></p>	<p>Yes, borrow to buy fishing gear. I received between RM13,000 to RM14,000. But when there is no catch, how can I pay back? That is why they deduct from (fishermen) living allowance.</p>
<p><i>...yang lepas punya keluar bantuan dia dapat, okay, dia dah jual, keluar yang baru, dapat lagi, orang yang sama, macam mana? Lepas tu issue bangkit,</i></p>	<p>... the same person received assistance, sold it, and got it again, how does it work? Then more issues were raised, people said that fishermen do not appreciate the</p>

Original	Verified Translated Version
<p><i>cakap orang nelayan tak hargai bantuan, jual, sedangkan bukan nelayan yang dapat, orang yang tak pernah kerje nelayan. Bila Datuk (Ketua menteri) marah nelayan, datuk kena fikir juga, siapa yang jual? [Faiza/18]</i></p>	<p>assistance, they sell it, but the truth is, it was not fishermen who received assistance, but those who are not fishermen. When Datuk (Chief Minister) scolded the fishermen, he has to think, who sold it?</p>
<p><i>Ya, saya sudah minta banyak kali, tapi mereka kata takde lagi. Cina memang susah mau minta, mereka bagi orang melayu saja. Mereka bagi kawan mereka, bukan bagi orang yang perlu. Ada orang yang dapat dua tiga kali. Engin pun susah nak dapat. [Xing/18]</i></p>	<p>yes, I have applied many time (from the authority), they say don't have it anymore. Chinese very difficult to get, they only give to Malay. They only give to their own friend, not to those who need it. Some people had more than once. Even engine is so difficult to get.</p>
<p><i>mereka tu pilih kasih. Macam kita ni tak layak. Mohon tu ada la, katakan 30 orang, orang yang sama je pergi. Dia tak macam satu kampong 30 orang, kampong satu lagi 30 orang, tak pe la, kira adil la, kira semua orang kampong tu tahu la. Ni, balik balik orang yang sama. Orang yang pergi kursus, dah habis balik baru bagi tau pergi kursus ni, kursus tu. Sampan ke, engine ke, orang tu orang tu juga yang dapat, orang yang sama dapat. Sampan bagi orang yang tak pergi laut, ada yang tak tau nak start engine pun ada, ada yang dapat, dapat lagi pun ada, dia jual, dapat duit beli motor. [Syukur/17]</i></p>	<p>They (the authority) are bias, as if we are not eligible. Let's say 30 people apply, only the same (few) person will get it. It is not like 30 people from every village will get it, if that's the way, then its fair as it means every village get it. But what happened here is the same person will always get it. Those who went for any workshops, they will only tell others they went for the all the workshops when its over. Whether its <i>sampan</i> or engine, the very same person will get it. <i>Sampan</i> were given to those who do not go to the sea, some of them don't even know how to start engine. Some got it more than once, they sell it, and use the money to buy motor.</p>
<p><i>dia pilih orang...kalau takde nama dalam tu, tak boleh la. Majority orang orang yang sama je [Faiza/23-24]</i></p>	<p>They choose people ... if (our) name is not in the list (selected), then (we) don't get it. It's often the same person (who get it).</p>

Original	Verified Translated Version
<i>bukan (siapa nak pergi, daftar), dia pilih kawan kawan dia, bukan bagi siapa yang nak pergi [Din/30]</i>	No (anyone who wants to go, they register), (then) they will choose (their) own friend, not to those who wants to go.

4.3.3 Risk Association to Fishing

Finding 4: The majority of respondents had short term plan instead of long-term plan in dealing with extra income.

This finding is in line with news published on the 16th May 2016 that “78% of Malaysians do not have enough funds for retirement” (Today Online, 2016). This news report was made based on EPF contributions. This makes it worst for the fact that all self-employed fishermen do not have any EPF contributions. According to the General Manager of LKIM Pulau Pangkor, some elderly fishermen has the misunderstanding that the monthly allowance for fishermen is their retirement fund, therefore, they kept pestering the LKIM to pay them even when they are no longer active in the sea.

To make it worse, none of the 15 respondents purchased any kind of insurance in case of emergency, besides the minimal takaful insurance made compulsory by the LKIM. This happened despite the fact that 50% of the respondents agreed that there is high risk of poor weather which deterred them from going to sea, 20% said that poor weather can cause accidents which may take their lives and 20% were worried about the possibility that their health condition might stop them from being a fisherman in the near future. However, they did not have enough of extra income to “prepare” for future emergency. This is in line with the news report by The Star that Malaysians are grossly under-insured,

and when they face health or death crisis, their family members will face difficulties to cope with their daily household expenses (Chin, 2016).

Original	Verified Translated Version
<p><i>insurance yang kami buat ni insurance nelayan, takaful, bayaran tahunan, itu saja...yang lain kalau ada balance 100 or 200 semua masuk simpanan untuk anak anak. [Khairi/42]</i></p>	<p>The only insurance we (I) have is fishermen takaful insurance, with yearly payment, that's all ... even if I have balance (extra income) of RM100 or RM200, I will save it for my children.</p>
<p><i>kalau cuaca teruk, memang tak boleh tahan simpanan tu, sebab kos hidup tinggi sekarang... tahan sebulan tu pun tak semestinye cukup [Din/7]</i></p>	<p>If the weather is poor, (my) savings will not last long, because cost of living is high now ... (savings) might not last for one month.</p>
<p><i>kesihatan la, macam kaki saya ni, dulu accident, kena masuk plate, kadang kadang cuaca sejuk, memang sakit sangat, tak boleh ke laut [Maniam/40]</i></p>	<p>Health (issue), plate was inserted into my leg after an accident last time, sometimes when its (weather) cold, it can be very painful, (I) can't go to the sea.</p>
<p><i>tu pun belum kira kalau peralatan, enjin rosak lagi. Itu kalau barang barang kita rosak, masa tu memang kita pokai, sebab kos nak baiki engine tu tinggi. kalau rosak, kalau tak boleh repair, duduk rumah je la, nak buat ape lagi [Faiza/6&19]</i></p>	<p>Cost incurred when fishing gear or engine spoil is not included yet. If our (my) things (fishing gear or engine) spoil, we (I) will be broke, because cost of repairing engine is high, if spoil and can't be repaired, (I have) to sit at home, what to do?</p>
<p><i>Kalau kesihatan tak bagus, memang tak dapat ke laut, bahaya, tu dua bulan lepas, baru seorang nelayan mati tengah laut, sebab sakit jantung... [Syahir/20]</i></p>	<p>If health condition is not good, (I) truly can't go to the sea, it's dangerous. Two months ago, one fisherman died in the middle of the sea due to heart attack.</p>
<p><i>Bila cuaca buruk memang tak dapat ke laut, tapi kalau tak teruk sangat saya</i></p>	<p>When the weather is poor, (I) can't go to the sea, but if it is not too bad, I will just</p>

Original	Verified Translated Version
<i>turun je, nak buat macam mana, kalau tak mana nak dapat duit...tu la nelayan lain marah saya, takut apa apa terjadi nanti, menyusahkan orang je...[Shah/33]</i>	go, what to do? If not, where do I get money from? That's why other fishermen scold me, they are worried that something might happen to me and (I) will bring trouble to other people.
<i>banyak. Bubu ni pun risiko tinggi juga, kadang kadang hilang terlalu banyak. [Din/16]</i>	Many (missing). (Using) fish trap can be risky, many has gone missing.

4.3.4 Willingness to Change

Finding 5: The majority of respondents switched from working for others to operate own *sampan*, with a few changing or multiplying their fishing methods.

70% of the respondents shared that they started their fishing activities in deep sea, i.e. Zone C, where they worked with mega fish operators or boat owners. Somewhere along the line, they switched to Zone A using their own fishing *sampan*. On top of that, 66% of them mentioned that they had multiplied their fishing area within Zone A. The main reasons for such changes included following fish availability and the fact that most of the big boat owners are hiring foreign workers. These two findings showed that a majority of the coastal fishermen had indeed gone through fishing intensification process.

Original	Verified Translated Version
<i>... Dulu pakcik kerje dengan boat besar, tapi sekarang mereka dah ambil pekerja asing banyak, banyak sangat pekerja asing. Kami complaint pun tak boleh jalan. [Hanapiah/14]</i>	... Uncle used to work with big boat, but now they are taking in many foreign workers. We (I) have lodged complaints, but nothing changes.

Original	Verified Translated Version
<p><i>sebab dulu ada banyak ikan, sekarang ni dah ada pembangunan kan, jadi lain la, ikan tak pergi ke sana dah, ikan ikan pun dah ke tengah laut la. Kena tukar tempat la. Ada juga sebab kena ganggu oleh boats besar, sepatutnya mereka ke tengah laut, tapi sebab tepi ada ikan, mereka ganggu la [Syukur/16]</i></p>	<p>Used to have many fishes (here), but fishes don't come near now due to development, fishes have moved to deep sea. (I) have to change place (fishing area). (We are) affected by big boats too, they are supposed to go to the deep sea, but because there are still fishes at the coastal area they come near and disturb us (our fishing activity)</p>
<p><i>yang berubah kira kawasan je la, sebab dulu kita boleh tangkap kat kawasan WALE kan, sekarang ni kita nak memancing bawah tu pun kita kena sorok sorok. Kena menyorok, tak boleh pancing kat luar jeti dia, dia kacau kita, dia tak bagi kita pergi memancing kawasan tu, dia macam marah kita masuk kawasan dia, jadi kalau kita nak pergi juga, kita kena menyorok, masuk melalui jalan haram..sebab itu kawasan kita memancing dulu [Faiza/14]</i></p>	<p>Only change of fishing area, because we used to be able to fish in WALE area, but now even if we want to fish there, we have to do it secretly, because we are not supposed to fish under their (the developer) bridge. They do not want us to fish within their area, they are not happy when we go there, that's why if we want to go there, we have to go there secretly, use the unlawful way, but that was the area we used to carry out fishing activity.</p>

However, a random chat with a few big boat operators showed that this was not the entire truth. Big boat operators admitted that they had indeed hired many foreign workers, but it was not merely because they were “cheaper”. Foreign workers were favoured over local fishermen mainly because each fishing trip took more than 3 days, this gave the foreign workers an added advantage as the local fishermen had their own family commitments which required them to come home on a daily basis. Moreover, big boat operators shared their challenge of having foreign workers in relation to working

permits by saying “I would rather hire local workers if they are as committed as the foreign workers, why take all the trouble of hiring foreign workers?”

In terms of fishing methods, only three out of fifteen respondents agreed that they had multiplied their fishing methods to increase income generated or to gain consistent income. When compared to their education level, one of them is a college graduate and the other two are high school leavers, i.e. higher level of education as compared to the remaining respondents. This is in line with Hassan, Shaffril, D'Silva, Omar, & Bolong (2011) who reported that there is a direct relationship between educational achievement and people’s application of knowledge and decision making, i.e. those with higher education level are more willing to adopt new method usage and tend to have greater exposure to various methods.

Original	Verified Translated Version
<p><i>Pergi laut ni, kalau hanya pergi memancing je, tak cukup makan. Kita kena ada dua tiga macam kerje. Macam pagi, kita tarik bubu ketam, sebab benda tu kita boleh budget itu harian, kalau yang lebih lebih tu kita pergi pancing, pukat. (sejak mula jadi nelayan memang guna cara lain lain ke macam mana?) Yang mula mula tu memang tak pandai lagi la, sebab tu belajar sikit sikit, lama-lama kawan cakap buat macam ni, macam tu, tu la ubah sikit sikit, dapat sini sikit, sana sikit, yang tu yang boleh cukup makan. Kalau nak berlebihan tu memang susah, sebab nak belanja memang kena budget sekarang [Faiza/1-2]</i></p>	<p>To be honest, it (income) is not enough, so I had to use two three different methods, depending on fishing (fishing rod) alone will not be enough to survive. We (I) need to use few methods. For example, we (I) will pull crab trap, because that activity we (I) can estimate (the outcome), the remaining (time) we (I) go for fishing (fishing rod) or trawl. (Ever since you became a fisherman, have you ever used other fishing method?) In the beginning, I was not good at it (different fishing method), later I started learning, when my friend says try this, I will try to change slowly. (With that I managed to gain a bit (income) from here, a bit from there, then it will be enough to survive. Without this extra (income), it will be difficult, that’s why we have to budget (our expenses) now.</p>

Original	Verified Translated Version
<p><i>Dulu memang guna pukat saja, tapi sekarang guna bubu ketam juga, dapat la sikit sikit bila cuaca tak baik. [Goh/5]</i></p>	<p>(I) used to use fishing net only, but now I use crap-trap too, (then I managed to) gain a bit more (income) when the weather is poor.</p>

On the other hand, two of the respondents agreed that they have changed their fishing method from multiple methods to only one method as they were approaching retirement phase of life. One of the respondents mentioned that she has been collecting oysters on daily basis, besides hightide season, but the number of days per week has been decreasing over the years. Figure 4.1 shows one of the fishermen’s wife collecting oyster, while Figure 4.2 shows some simple tools they have been using and some oyster collected. They will usually collect a full bucket of oyster and sell in the local market to contribute to their household income. This result is in in line with Eneyew & Bekele (2008) who reported that there is a negative relationship between age and farmer’s decision to intensify or diversify, i.e. farmer’s participation rate in intensification and diversification decreases as their age increases. At the same time, other researchers reported the same result in other fields (Barret et al., 2001; Roa, 2007).

Original	Verified Translated Version
<p><i>Saya dulu bila anak seorang dua je memang la ikut pakcik ke laut, bawa pukat macam macam. Sekarang makcik ketuk siput je, di tepi batu batu tu penuh, isinya orang lain panggil tiram... [Faiza’s mom/1]</i></p>	<p>I used to have two kids, that’s why I can follow uncle (husband) to the sea, with various kind of fishing nets. Now I harvest oysters only, there are many oysters attached to the stones at the coastal area.</p>



Figure 4. 1: Fisherman's wife collecting oyster (side income)



Figure 4. 2: Tools used for oyster collection and some oyster collected

In other words, the majority of the respondents had not changed their fishing method, let alone multiplying it while most of them agreed that they did not change as they were not interested in other fishing methods. This result is consistent with the suggestion made by Warren (2002) that intensification might be an ideal solution to cope with population growth, market economy, socio-cultural change and modernization of rural society at large. One interesting fact to note is that regardless of whether the

respondents had intensified or not, half of the respondents agreed that their income was lesser than at the start of career and the other half agreed that their income was inconsistent. This is not consistent with research done by Kasperki & Holland (2013) whereby intensification reduced variation in annual income and thereby reduced financial risk. This could be due to the saturation level as mentioned in Chapter 1. In other words, the next findings, i.e. diversification of livelihood strategies, will give a better option for fishermen in achieving sustainable income.

Original	Verified Translated Version
<p><i>Saya memancing je, lain semua tak, sebab minat kan. Memang pukak boleh dapat lebih, tapi saya tak minat la kiranye. [Shah/20]</i></p>	<p>I use fishing rod only, nothing else, because that's my interest (hobby). Of course, using fishing net can bring more income, but I am not interested in using trawl.</p>

Finding 6: The majority of respondents indicated that they did not have other source of income and did not have unused resources to generate extra income.

60% of the respondents agreed that they did not have other sources of income, while 40% indicated the other way, i.e. not having enough or inconsistent income from fishing activities. This situation can be explained through six out of the seven determinants of livelihood diversification choices by Warren (2002). The reason for excluding the seventh determinant, i.e. gender relationship, is mainly because fishing activities are mainly dominated by the male as opposed to their female counterparts.

a. Availability of key-assets

Key assets include savings, land, labour, education and access to market or employment opportunities, access to common property natural resources and other public goods, etc. (Dercon & Krishnan, 1996). In this research, eight out of fifteen respondents agreed that they had not been diversifying as they did not have enough capital. For example, one respondent explained in detail that he wanted to diversify into engine repairing work, but the cost of starting a workshop was too high and he did not have enough space at his backyard to do such work.

Original	Verified Translated Version
<p><i>ya, sumber takde. Sebab saya dah belajar bab engine ni pun dah lama dah, masa saya belajar kat MARA dulu, giat MARA kat Lekir tu kan, saya belajar sana. Sejak saya balik, takde space, memang takde space. Benda tu memang saya boleh buat, tapi takde kemudahan. Nak ambil orang lain punya tu masalah juga, kita nak letak kat mana, sebab barang bengkel memang banyak, tak boleh, takde safety letak belakang rumah je. (Kedai kedai dekat sini? Takde kedai kosong untuk sewa?) ada, tapi kalau nak ikut, kita tak boleh sewa, nak bayar dia punya kos untuk sewa sahaja dah RM3000, kalau di pekan sana...macam mana kita nak rolling? Sini sewa memang mahal. Kita nak makan pun miss kadang kadang (laughing), nak bayar sewa kedai, tak boleh la. [Faiza/12-13]</i></p>	<p>Yes, no resources. Because I have learnt about (handling) engine for a long time, I studied in MARA when they (the institution) were active in Lekir. But ever since I came back from there, I couldn't find an appropriate space. I can do the work, but there are no facilities available. I can't occupy another people's space, and I can't keep it at my backyard as it is not safe. (what about renting a shop lot near by?) yes, there are (shop lot) available in town, but I can't afford, the rental itself cost RM3000, how to roll (my capital)? Cost of rental is high here. We even missed meals at times (*laughing), what more paying rental, we can't (afford).</p>
<p><i>sebihi sampan kita boleh dapat dalam 7000, kos dia saya rasa dalam 2000 la, kita boleh untung daripada sampan tu dalam 5000...boleh buat, cuma tapak je takde, nama syarikat semua sudah ada ... semua tanah cina...tanah orang, (pointing to the teres house area) itu pun tanah orang, dulu kita buat permohonan</i></p>	<p>We can sell one <i>sampan</i> at RM7000, and I would say the cost (of production) is about RM2000. We can earn RM5000 from there. It is workable, but there is no space, we even have our company name registered, but all the land here belongs to the Chinese, its theirs, (*pointing to the terrace house area), even that (piece of</p>

Original	Verified Translated Version
<i>tanah tu, tapi tak boleh dapat.</i> [Khairi/49-51]	land) belongs to them. We tried applying, but we never got it.
<i>Dulu makcik ada juga pergi khusus pertanian, nak buat kisar kelapa guna mesin, buat keropok lekor, tapi, mana nak cari modal beli mesin tu semua?</i> [Hanapiah/20]	Last time aunty (I) used to go for agricultural related courses, such as how to grind coconut using machine, and how to make fish crackers, but where to find capital to purchase machine and other related things?

In terms of human capital, 80% of the respondents mentioned that they did not have any skills or knowledge to generate income from other areas, with only two of this group mentioned that they were willing to try something new if they are trained to do so, while the rest stood firm on their views that they were not willing to try out anything else. This is in line with the other response they had provided, i.e. only five out of fifteen respondents had attended courses organized by LKIM or Fishermen's Association. However, when asked for the reasons for not attending, none of the fishermen mentioned that they did not attend because of lack of interest, but due to the fact that they were not informed or not selected. Therefore, the right processes have to be in place in strengthening the contacts between these authorities and the coastal fishermen community (DFID, 1999). These two reasons revealed an inconsistency of their responses, which needed to be further evaluated through quantitative research on a larger scale.

On the other hand, a small number of the respondents indicated that they had tried diversifying before, i.e. worked as a contract worker, produced handicraft, and worked in the hotel. However, it did not last for long as they are used to the lifestyle of a fisherman and were not used to being limited by fixed working hours.

Original	Verified Translated Version
<p><i>kraf tangan, ada, tapi sekarang ni tak buat dah ...saya buat ikan buntal tu. Dulu saya ada buat, tapi sekarang tak dah, lagipun dia punya tu (raw material) susah nak dapat dah ... (saya) dah berumur dah. Bukan pasal laku ke tak, tapi nak dapatkan bahan dia tu susah. Sekarang buat pun kalau ada tempah... [Mustapha/12-14]</i></p>	<p>Handicraft, yes, I did, but not anymore ... I used to make the puffer fish. I made it last time, but not anymore, mainly because its difficult to get the raw material ... I am old already. It is not about whether it can sell or not, but it is difficult to get the material. But if there is order, I will still make it.</p>
<p><i>(Pakcik ada tak kemahiran lain, yang pakcik boleh gunakan untuk tambahkan untung?) ... Mana ada? Yang pakcik tau pun jadi nelayan je. [Hanapiah/19]</i></p>	<p>(Uncle, do you have any other skills which you can use to increase your income?) ... No, I only know how to be a fisherman.</p>
<p><i>... Ada kawan2 bagi peluang darat la, tapi memang tak boleh. Dah biasa dah dengan laut. [Syukur/18]</i></p>	<p>... My friend used to offer me jobs on the ground, but I can't. I am so used to the sea.</p>
<p><i>eh dulu makcik sapu sampah tepi laut teluk nipah 11 tahun, sapu tepi pantai [Faiza's mom/12]</i></p>	<p>I used to sweep the beach at Teluk Nipah about 11 years ago.</p>

b. Risk management

According to Warren (2002), there is a direct relationship between the level of risk and one's decision of seeking for the second-best income-generating alternatives. In this research, as mentioned in Findings 4, there are various kinds of risk associated to fishermen. However, those risks don't seem to work as a motivator for the coastal fishermen to venture into other industries. The majority of the respondents indicated that even though it was risky, they would still go out to sea as that was their only source of income. Instead, the respondents chose to rely on their own experience, and information provided by other fishermen on weather condition, marine activities, etc in minimizing

risk. This finding is in line with Nguyen and Leung (2009) who concluded that fishermen tended to be less sensitive towards the weight of risk, instead, they would choose to adapt to their unique environment by making appropriate decisions under the uncertain environment, i.e. seasonality.

c. Strengthening the household asset basis

Only a small minority, i.e. four out of fifteen respondents, indicated that they will save for their children’s education if they had extra income. It is interesting to note that all four of them had been diversifying their source of income in some ways, which included contract work, repairing of engine, cleaning and operating their own business. At the same time, they did not wish to have their children become a fisherman one day, unless it was merely a hobby. Moreover, one of the four respondents also mentioned that they would save extra income generated for future investment. These facts showed that the respondents were preparing to strengthen their household assets through diversification of income, and preparing their children for a more favourable income generation pathway.

Original	Verified Translated Version
<p><i>(if I have extra income) buy new net la ... still ok, but if really not enough, then will have to look for other source of income, because some time we get to harvest a lot, sometime not much. I don't encourage (sons to be fishermen), but they are interested, haizz... but if they really like it, then I will not stop too. [Xing/6,19&21]</i></p>	<p>Nil</p>
<p><i>Berubah (taraf hidup 10 tahun akan datang). Akan mengurang, bukan lagi menambah. Mesti kena cari kerje</i></p>	<p>It will change (livelihood status in 10 years' time). It will be worse, not improving. I must find side income. (will</p>

Original	Verified Translated Version
<p><i>sampingan le ni. (nak galakkan anak jadi nelayan tak) tak nak la, nak bagi dia peluang belajar la, nanti biar dia hidup senang sikit la. Bila kita tua nanti, mungkin dia boleh tolong kita pula la. Harap harap macam tu la. [Syukur/18-20]</i></p>	<p>you encourage your children to be fisherman?) No, I want to give them the opportunity to study, so that they will have a better life. When we are old, they may be able to help us, that's my wish.</p>

d. Opportunities

According to Warren (2002), one will be encouraged to diversify the source of income if opportunities are in place. However, this is not entirely true according to this study. As mentioned in Chapter 1, Pangkor Island is a developing island, especially in the tourism industry. In other words, opportunities in other industries are available. However, 40% of the respondents were not generating income from other sources for various reasons as discussed in the previous findings. Therefore, this research has included the willingness to change as part of the research questions, to investigate if personal attitude may prevent respondents from taking up opportunities available and achieving their sustainable income aim.

e. Identity and vision of the future

Even though Warren (2002) indicated that identity and vision of the future may shape one's diversification decision, however, in this research, the researcher was not able to identify a clear direct relationship between the diversification decision made and the respondents' view about the future. For instance, 45% of the respondents who had diversified their source of income perceived an improvement in their livelihood in 10 years' time, while another 45% perceived that their livelihood will worsen in 10 years' time (response presented in the previous findings). This needs to be further verified through quantitative analysis.

4.3.5 Livelihood Outcome

Finding 7: The majority of respondents believed that their livelihood status will worsen, therefore, discouraging their children to be fishermen.

33% of the respondents indicated that their livelihood status will worsen, 13% said it would improve, 6% were not sure, but hoping for it to improve, 13% said it would improve if the right resources were in place, 13% mentioned that it would remain unchanged, while 26% had no idea how it is going to be in the next 10 years.

In short, majority of the respondents were not putting high hopes on their future livelihood status, which caused them to discourage their children from taking up the same life path. This aim could be dangerous for Malaysia as fishing output from Perak, particularly from Pangkor Island contributes to a significant portion of the country's fishing output (refer to Chapter 1).

This finding indicated the important role of the local authorities in encouraging the expansion of fishing industry through the right process, as mentioned in Findings 6.

Original	Verified Translated Version
<i>(tarafhidup 10 tahun akan datang) kalau saya dengan isteri saya mungkin susah, tapi anak-anak mungkin senang. Sebab yang pertama bila saya dapat pendapatan yang lebih sikit, kita orang taka da, semua labur pada anak, kalau saya sakit atau isteri saya sakit, tak tau nak cakap la. [Khairi/53]</i>	(standard of living in the next 10 years) It would be difficult for me and my wife, but for our children, it could be better. Because firstly when I got any extra income, I will invest everything in my children. So, if my wife and I fall sick, then I am speechless.
<i>(10 tahun akan datang) macam ni juga la rasanya. Kalau panjang umur pun, rasa2nye macam ni juga la. Sebab kerje nelayan ni, umur pun dah dekat 50 dah,</i>	(in 10 years', time) it will be the same I think, even if I can live longer, it will still be the same I feel. Because I am a fisherman, and I am turning 50 soon, what

Original	Verified Translated Version
<i>fikir apa pula? Kalau umur muda lagi, boleh la ada perubahan. [Halil/31]</i>	can I think about? If I am younger, maybe I can make some changes.

Finding 8: The majority of respondents were satisfied or somehow satisfied with their current livelihood status, despite having inconsistent or insufficient income.

33% of the respondents indicated that they were satisfied with their current livelihood status, while 53% of the respondents noted that their current livelihood status was somewhat okay. However, this information alone might not be enough to reflect their actual state of mind as a majority of these group of respondents mentioned that they had no idea how they want their livelihood status to be. At the same time, they were expecting that their livelihood status to be worse ten years down the road.

According to DFID (1999), livelihood outcomes are the achievements of livelihood strategies. Therefore, the researcher should not assume that maximization of income reflected the achievement of livelihood strategies, the only element of livelihood outcome or the only way to measure sustainable livelihood status. However, as the main coastal fishing activities often did not generate a stable income, with exposure to various kinds of risk, it can leave a family vulnerable (Betcherman & Marschke, 2016). As the researcher compared respondents' response on current livelihood status, the expectation of future livelihood status i.e. Findings 1, no respondent mentioned that income was enough to cover their expenses, it was clear that there was a definite direct relationship between income (as one dimension of livelihood outcome) and livelihood status.

On top of that, Findings 4 clearly discussed that the respondents did not have much long-term plan which could be used to achieve other elements of livelihood outcome, such as increased well-being, reduced vulnerability, improved food security, or

sustainable usage of natural resources. This further showed that increase in income is the main priority of the respondents, which supported the researcher's objective of focusing on sustainable income in this particular study.

Original	Verified Translated Version
<p><i>nak kata puas, memang tak puas la. Kita pun ada kemahuan, nak bawa anak anak pergi bercuti ke, nak spend duit sikit ke. Tapi tak dapat buat lebih lebih. Pergi dekat dekat ok la, dekat dekat pun tinggal rumah saudara, sebab hotel mahal., sebab kita kena budget, memang kena budget [Faiza/25]</i></p>	<p>Well, not really satisfied (with current livelihood status). We have our wants too, want to bring children out for holiday, want to spend a bit more. But we can't do much. We can go to some places nearby (for holiday), and stay in relative house, because hotel is expensive and we have tight budget.</p>
<p><i>puas hati dah ... [Halil/30]</i></p>	<p>Kind of satisfied ...</p>
<p><i>Taraf hidup kita sekarang kira okay la, cukup makan, tapi kita nak taraf hidup anak kita meningkat la, sebab tu kita cuba buat sebanyak yang mungkin untuk dia. [Maniam/45]</i></p>	<p>Our standard of living is okay now, enough for our meals, but we want our children standard of living to be improved, that's why we tried to earn as much as possible for them.</p>

Ellis (2000) indicated that maximization of return per unit of labour affects the choice of diversification, and this is determined by the cost of consumption as mentioned by Warren (2002). A respondent mentioned that he used to operate a small junk food stall with his wife. However, the inconsistency of profit generated from there, i.e. not enough to pay for the loan taken up as capital to start the business, forced them to stop the business. In other words, inconsistency in the return generated compared to effort given has discouraged some of the respondents from diversification.

However, this is not always valid. Two other respondents mentioned that they were still putting effort in operating their food stall even though profit generated from it

depended largely on the income generated by fishermen or tourists, depending on their target market. One of them who operated an ice blended stall mentioned that they would be doing even better if the authority could provide them with a mobile kiosk. The other respondent who was already operating using kiosk provided by the local authority mentioned that they were saving money to expand their small kiosk. Figure 4.3 shows a sample of stationed kiosk provided by the Azam Niaga.

Even though one respondent showed a passive action taken, while the other respondent was taking an active step, both showed that some respondents agreed that diversification helps in increasing income, despite inconsistency in the return per unit of labour.

A few other respondents who were generating a fixed income from other industries, such as cleaning and hospitality. These incomes seem to be minimal, i.e. RM500 per month, as it did not seem to be maximizing the rate of return per unit of labour put in, but they believed that this was important to pay of fixed expenses which might not be able to be supported by inconsistency in fishing income. In other words, it is line with Warren (2002) that the cost of consumption and seasonality will determine the decision of diversification.



Figure 4. 3: Sample kiosk

However, as mentioned in Findings 2, a majority of the respondents chose to either postpone expenses or dug from their minimal savings to cover the cost of consumption instead of generating extra income. As mentioned by Warren (2002), if food was available or could be self-produced, i.e. in this case, from fishing activities, it might prevent the respondents from engaging in other income generating activities.

Original	Verified Translated Version
<i>Adalah, kerje bersih bersih di hotel, dapatlah RM500 sebulan, cukup lah untuk bayar bil, bayar sewa. [Iza/35]</i>	I do, just some cleaning job in the hotel, which gave me RM500 per month, at least it's enough to pay off some bills and rental.
<i>sekarang tak mau dah, tak mampu nak bayar. Dulu pakcik pinjam rm3000 (untuk mulakan perniagaan), kena bunga rm600, tak berbaloi, untung pun tak banyak tu, tak mampu nak bayar. Sebab keropok tu mana nak dapat untung</i>	I don't want it anymore now, I can't afford to pay. Last time I borrowed RM3000 (to start business), and I was charged RM600 of interest, it is not worth it, I didn't even earn that much, I can't afford to pay (the instalment), because selling crackers doesn't bring a lot of

Original	Verified Translated Version
<i>banyak, jual kecil kecil tu, untuk budak budak makan je. [Hanapiah/18]</i>	profit, it's just a small business, I was just selling to kids.

4.4 Summary

This chapter has presented the process of how qualitative data was coded, analyzed and interpreted. This had result in the discussion of eight major findings. Fishermen income is inconsistent and generally not enough to cover basic expenses, hence the coastal fishermen chose to apply coping strategies, i.e. digging from savings or manage expenses, which trade-off long term financial plan or capital to generate more income. Another commonly used coping strategy is to seek for external help, which may lead to over reliance. Qualitative research also shows that livelihood intensification, has been a more preferred choice if livelihood strategies changes is needed, as compared to livelihood diversification. Lastly, majority of the coastal fishermen are somehow satisfied with their current livelihood status, but still discourage their next generation to inherit the same career path. These findings set a platform for the next phase of research, i.e. quantitative data collection, analysis and interpretation.

CHAPTER 5 ANALYSIS AND RESEARCH FINDINGS FROM QUANTATIVE STUDY

5.1 Introduction

The researcher tried to measure how different variables might affect the fishermen's decision on making a change in their livelihood strategies. It was never the researcher's intention to adopt the entire framework of DFID or IDS Sustainable Livelihoods, i.e. by assessing assets available to the fishermen. The main reason for this action was that the feasibility study done showed that the fishermen were a bit reluctant to share the amount of various capital assets, or most of the responses gathered were negative, i.e. "I do not have the money, I am not educated, I am hoping to get more help from the authority". Therefore, the researcher was of the view that these data might not be a valid data for any analysis to be done.

On that note, this research has included a latent variable into the framework, i.e. the fishermen's willingness to change. Willingness to change is part of attitude, which cannot be measured directly. However, the researcher was able to collect this data by changing the way of asking questions, such as "Which of the following industry will you be interested to venture into to increase income?"

This chapter assesses the LSDF generated based on qualitative data collected and validate the hypothesized relationships. A total of 165 responses were collected from coastal fishermen across Pangkor Island and were used to validate the proposed LSDF. This stage can be divided into three main steps: (1) using EFA to identify groups or clusters of variables; (2) using regression analysis and SEM to test all the hypotheses; and (3) using SEM to confirm or to test the goodness of fit of the LSDF.

The questionnaires were distributed to 200 respondents and 165 were collected. Questionnaires were distributed through the following channels (1) from house to house

and collected back within an hour, (2) Met fishermen on their fishing boat as they repaired their fishing tools, read out word for word (without explanation of the questions) and recorded their response, (3) Passed to representatives of a few villages, and collected the following day, and (4) Passed to fishermen at the petrol kiosk as they claimed for their subsidized diesel, recorded their contact number, and collected the following day.

5.2 Instrument Reliability

Reliability test was carefully done to test the consistency of data collected. Each variable was tested using the reliability analysis function of SPSS to generate value of Cronbach's alpha. At the same time. The test managed to identify the change to Cronbach's alpha coefficient when any of the items were to be eliminated. This assisted the researcher to improve the Cronbach's alpha value by dropping items which reduced the consistency level of the data. Cronbach's alpha value for all variables was .751. The Cronbach's alpha of each variables was presented in Table 5.1.

Table 5. 1: Cronbach's Alpha Value of Each Variables

Variables	Cronbach's alpha
Coping strategies – Savings (3 items)	.910
Coping strategies – Manage expenses (2 items)	.813
Coping strategies – External help (4 items)	.743
Coping strategies – subsidies / grant (4 items)	.715

Risk (6 items)	.767
Livelihood intensification (3 items)	.724
Livelihood diversification (4 items)	.819
Sustainable income (4 items)	.788
Willingness to learn (3 items)	.826
Willingness to venture (5 items)	.945

The number of items had been reduced as the researcher looked into the possibility of improving the value of Cronbach's alpha, by looking into possible changes to this value if some items were to be removed. Table 5.2 showed some example of changes done based on Cronbach's alpha if the item was deleted.

Table 5. 2: Cronbach's Alpha Value If Item Deleted

Variables	Cronbach's alpha	Cronbach's alpha if item deleted
Coping strategies – Manage expenses	.519	
- Cut expenses (Item 1)		.151
- Cut fishing cost (Item 2)		.813
- Postpone payment (Item 3)		.262

Variables	Cronbach's alpha	Cronbach's alpha if item deleted
Coping strategies – Subsidies / Grant <ul style="list-style-type: none"> - Fishermen monthly allowance (Item 1) - Free <i>sampan</i> (Item 2) - Free engine for <i>sampan</i> (Item 3) - BRIM/mykasih/ekasih (Item 4) - Free repair house / replace house (Item 5) 	.616	.489 .514 .544 .506 .715
Risk <ul style="list-style-type: none"> - Health issue (Item 1) - Poor weather, not able to work (Item 2) - No bait (Item 3) - No output (Item 4) - No money to repair fishing equipment (Item 5) - Loss of fishing equipment (Item 6) - Poor weather, causes accident (Item 7) 	.686	.655 .691 .767 .610 .611 .638 .618
Livelihood intensification <ul style="list-style-type: none"> - Area of fishing (Item 1) - Type of output (Item 2) - Way of fishing (Item 3) 	.560	.437 .367 .331

Variables	Cronbach's alpha	Cronbach's alpha if item deleted
- Mode of employment (Item 4)		.724
Willingness to learn	.696	
- Take up course		.372
- On the job training		.674
- Spend time gaining knowledge		.380
- Do not see the need of learning		.826

As there were significant changes deleting the following items could bring to Cronbach's alpha, the researcher decided to remove the items, so to increase the reliability level of the tested variables and consistency level of data collected.

- a. Coping strategies – Manage expenses. One was removed to improve Cronbach's alpha value from .519 to .813
- b. Coping strategies – subsidies / grant. One was removed to improve Cronbach's alpha value from .616 to .715
- c. Risk – No bait – this item was removed to improve Cronbach's alpha value from .686 to .718
- d. Livelihood intensification – Item 4 had to be removed as it this move could improve Cronbach's alpha from .560 to .724
- e. Willingness to learn – Item 4 had to be removed to improve Cronbach's alpha from .696 to .826.

Besides, reliability test was also carried out on data collected through reading out to respondents versus data collected from respondents without any assistance by researcher. The first group (69 respondents) showed a Cronbach's alpha value of .763 and the second group (96 respondents) showed .801. This result shows that reading out to respondents did not affect the consistency of data collected.

The next section explains how the validity test was done through EFA.

5.3 Instrument Validity

EFA is commonly used to discover the number of factors influencing the variables, and to identify which variables can go together (McDonald, 1985). Therefore, it is also frequently being used to examine the construct validity of quantitative research tools. Factor analysis is therefore useful when the researcher is working on reducing the number of variables and to place these variables into a meaningful category (Yong & Pearce, 2013). However, before EFA is done, it is necessary to do data screening according to requirements for factor analysis.

5.3.1 Data Screening

a. Multivariate normality test – to check for outliers

Outlier detection is an important data screening element to identify unusual behaviour of data or cases. In other words, outliers are cases which does not explain the variables involved. Rousseeuw and Zomeren (1990) proposed the use of Mahalanobis Distance to identify outliers. With that, outliers can be defined as any observations, i.e. value or data, having large Mahalanobis distance. Outlier, if any, has to be removed from

the analysis, so as to avoid misinterpretation of the output. In this study, the Mahalanobis distance multivariate normality test showed one outlier cases, which was excluded from this analysis.

b. Multicollinearity assumption

Multicollinearity is an unacceptably high level of intercorrelation among the independents, whereby it will result in independent variables or items not being able to be separated from one another (Garson, Testing Statistical Assumption, 2012). To test this assumption, the researcher used the tolerance and the Variation Inflation Factor (VIF) values to determine if there was any multicollinearity. The rule of thumb by Field (2009) is that the VIF value above 10 or tolerance value below .10 will result in problematic multicollinearity. In this research, the two values for all items fulfilled the rule of thumb by Field (2009), i.e. it did not violate the multicollinearity assumption.

c. Homoscedasticity:

Homoscedasticity refers to the fact that relationships of variables under investigation is the same for the entire range of dependent variable (Garson, 2012). Data which is lacking of homoscedasticity will be revealed when residuals for some portions of data is different from the rest. In this case, the research used the graphical method to test the homoscedasticity level. Scatterplot was developed by a graph made up of *ZPRED on the X-axis, and *ZRESID on the Y-axis. According to Field (2009), to meet the assumption of homoscedasticity, the scatterplot should show random array of dots across the graph instead of a funnel shape along the fit line. In this research, the scatterplot showed dots randomly scattered above and below fit line, with no funnel shape shown.

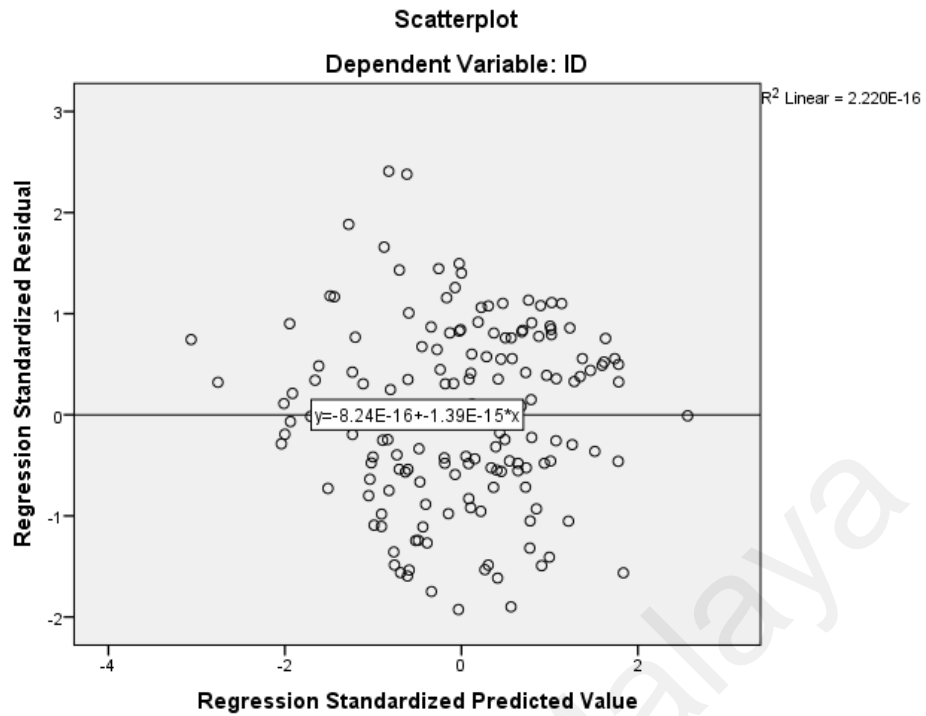


Figure 5. 1: Scatterplot to Test Homoscedasticity

d. Sample size:

Hutcheson and Sofroniou (1999) recommends at least 150-300 cases. As for SEM (which will be used later), the suggested sample size is between 100 to 150 as suggested by Anderson and Gerbing (1988). This research had an adequate sample size of 165 cases.

e. Missing data:

Frequencies analysis showed no missing values for this set of data.

f. Normality test:

Skewness and Kurtosis normality test was done on data collected as well. Data that is normally distributed should have Skewness test value of ± 2 and / or Kurtosis test value of ± 2 . Table 5.3 shows the result of normality test.

Table 5. 3: Skewness and Kurtosis Test Result

Variables	Skewness value	Kurtosis value	Test result
Coping strategy – Savings	-1.545	1.733	Normally distributed
Coping strategy – Manage expenses	-.714	-.721	Normally distributed
Coping strategy – Loan	-.643	-.844	Normally distributed
Risk associated to fishing	-1.388	.844	Normally distributed
Livelihood intensification	-.916	-.791	Normally distributed
Livelihood diversification	-.831	-.574	Normally distributed
Sustainable income	-1.714	1.086	Normally distributed
Willingness to learn	-.585	-1.276	Normally distributed
Willingness to venture	-1.280	.145	Normally distributed

g. Outliers:

A multivariate outlier is about case where the combination of scores on two or more variables that it distorts statistics and lead to both Type I and Type II errors (Tabachnick & Fidell, 2007). Outlier cases can occur due to incorrect data entry, failure

to specify missing values or outlier that is not a member of the population. In this research, multivariate outliers were checked using Mahalanobis distances.

To identify outliers based on Mahalanobis distances, the researcher identified the critical value based on criterion of $\alpha=.001$ with 36 *df*, the critical chi-square, $\chi^2 = 67.99$, i.e. cases with Mahalanobis distance above 67.99 is categorized as outliers.

In this study, there is one outlier, therefore, this case will be excluded from now on, leaving the research with sample size of 164.

5.3.2 Exploratory Factor Analysis (EFA)

EFA was done at this point of time to reduce the number of variables to be included in the later analysis. This type of analysis allowed the researcher to ensure that the questions asked, i.e. items employed, in the questionnaires were related to the hypotheses the researcher was testing. The main assumptions to be considered here was that each factor (component or variable) was associated with the specified questions (indicator) included in the factor, i.e. items employed were able to represent the related factors.

Results of EFA

1. Preliminary Analysis

Preliminary analysis was done by scrutinizing the correlation matrix (*R* value), refer to Table 5.4 for the extract of correlation matrix. The top half of the table consists of the Pearson correlation coefficient between all pairs of items, while the next half of the table consists of one-tailed significance of those coefficients. According to Field (2005),

if the one-tailed significance value of any factor is greater than 0.05, and at the same time the R value is greater than 0.9, problems will arise as it might have happened due to singularity of data. On top of that, the determinant value of this set of data is 4.713E-7, which is greater than the necessary value of 0.00001 (Field, 2005).

Table 5. 4: Extraction of Correlation Matrix

		Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08	Q09	Q10	...
Correlation	Q01	1.000	.620	.822	.267	.226	.349	.391	.113	.127	.140	.369
	Q02	.620	1.000	.669	.264	.347	.307	.337	.154	.218	.215	.344
	Q03	.822	.669	1.000	.337	.292	.340	.380	.143	.134	.167	.345
	Q04	.267	.264	.337	1.000	.222	.509	.441	.082	.156	.121	.122
	Q05	.226	.347	.292	.222	1.000	.374	.526	.094	.151	.059	.135
	Q06	.349	.307	.340	.509	.374	1.000	.627	.094	.037	.033	.095
	Q07	.391	.337	.380	.441	.526	.627	1.000	.182	-.003	.076	.232
	Q08	.113	.154	.143	.082	.094	.094	.182	1.000	.475	.540	.035
	Q09	.127	.218	.134	.156	.151	.037	-.003	.475	1.000	.418	.070
	Q10	.140	.215	.167	.121	.059	.033	.076	.540	.418	1.000	.003
	:	.369	.344	.345	.122	.135	.095	.232	.035	.070	.003	1.000
Sig. (1-tailed)	Q01		.000	.000	.000	.002	.000	.000	.075	.052	.037	.000
	Q02	.000		.000	.000	.000	.000	.000	.025	.002	.003	.000
	Q03	.000	.000		.000	.000	.000	.000	.034	.044	.016	.000
	Q04	.000	.000	.000		.002	.000	.000	.149	.023	.062	.060
	Q05	.002	.000	.000	.002		.000	.000	.117	.027	.226	.042
	Q06	.000	.000	.000	.000	.000		.000	.114	.317	.337	.112
	Q07	.000	.000	.000	.000	.000	.000		.010	.482	.167	.001
	Q08	.075	.025	.034	.149	.117	.114	.010		.000	.000	.330
	Q09	.052	.002	.044	.023	.027	.317	.482	.000		.000	.188
	Q10	.037	.003	.016	.062	.226	.337	.167	.000	.000		.484
	:	.000	.000	.000	.060	.042	.112	.001	.330	.188	.484	

a. Determinant = 4.713E-7

Besides, the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity are equally important in the preliminary analysis stage. Kaiser-Meyer-Olkin Measure of Sampling Adequacy test was done through the comparison between the size of observed correlations coefficients to the sizes of the partial correlation coefficients (Anastasiadou, 2006). According to Kaiser (1974) the acceptable values of Kaiser-Meyer-

Olkin Measure of Sampling Adequacy is anything above 0.5. The value for this set of data is .800 ($>.5$), i.e. the sample size is sufficient for the study (refer to Table 5.5). This showed that factor analysis is suitable for the set of data. Bartlett's test on the other hand tested the null hypothesis that the original correlation matrix is an identity matrix (Field, 2005). For factor analysis to work, a significant value of less than 0.05 is necessary, as this shows that R -matrix is not an identity matrix. The Bartlett's Test of Sphericity of data collected from this research is highly significant .000 ($P<.05$). This result further assured the use of factor analysis for this research.

Table 5. 5: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.800
Bartlett's Test of	Approx. Chi-Square	2221.574
Sphericity	df	406
	Sig.	.000

2. Factor Extraction

Next, factor extraction was done through SPSS using Principle Component Analysis based on the option chosen by researcher in customizing the eigenvalue cut-off of 1.0. This decision was made based on Kaiser's criterion. With the eigenvalue set, SPSS then extracted all factors with eigenvalue below 1.0, which in this set of data, was left with eight components (factors). Based on Table 5.6, it is clear that Component 1 contributed to 24.071% of variances before rotation, and 10.528% after rotation. Refer to Table 5.11 for the extraction of Total Variance Explained.

Table 5. 6: Extraction of Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.981	24.071	24.071	6.981	24.071	24.071	3.053	10.528	10.528
2	3.044	10.498	34.569	3.044	10.498	34.569	2.791	9.625	20.153
3	2.230	7.689	42.258	2.230	7.689	42.258	2.649	9.136	29.289
4	2.036	7.021	49.279	2.036	7.021	49.279	2.604	8.981	38.270
5	1.628	5.614	54.893	1.628	5.614	54.893	2.273	7.838	46.108
6	1.496	5.159	60.052	1.496	5.159	60.052	2.218	7.648	53.756
7	1.342	4.627	64.679	1.342	4.627	64.679	2.117	7.299	61.055
8	1.060	3.655	68.333	1.060	3.655	68.333	2.111	7.279	68.333
9	.923	3.182	71.515						
10	.854	2.943	74.458						
11	.690	2.380	76.839						
:									

Extraction Method: Principal Component Analysis.

3. Factor Rotation

At this stage SPSS had extracted eight factors, as mentioned earlier. SPSS then rotated those factors so that factors can be more interpretable. As recommended by Field (2005), Varimax is one of the orthogonal rotation approaches, as the researcher expected all the factors to be independent from each other. As the researcher had excluded any factors loading below 0.4, therefore, Table 5.7 displayed only the factors loading above 0.4. This decision was made based on Garson (2005), whereby in his research, he presented that the factor loadings above 0.5 were usually considered high loading factors, and below 0.4 was considered low.

To assess a research tool's validity level, the stipulated items (questions) should be loaded highly into their own component (variables) than on another component (variables) that existed on the LSDF. As Garson's principle was adopted, any item with a loading value below 0.4 was automatically removed from the Rotated Component Matrix. On top of that, the original Component matrix (matrix before rotation was done)

showed that most of the items were loaded heavily onto the first factor alone, but rotation of factor structure has solved this problem by loading factors heavily onto one factor (instead of first factor only). This has eased the interpretation process.

Table 5. 7: Rotated Component Matrix

	Component							
	1	2	3	4	5	6	7	8
intensification - area of fishing (INT1)		.578						
intensification - type of output (INT2)		.612						
intensification - way of fishing (INT3)		.639						
Sustainable view - extra income for emergency (SI1)				.655				
Sustainable view - extra income for holiday, send children to university (SI2)				.640				
Sustainable view - consistent income (SI3)				.804				
Sustainable view - more source of income (SI4)				.843				
Generated side income (DIV1)							.772	
major portion of income generated are from side income (DIV2)							.766	
Side income is fixed (DIV3)							.787	
Risk - no output (R4)			.660					
Risk - no money to repair fishing equipment (R5)			.756					
Risk - loss of fishing equipment (R6)			.736					
Risk - poor weather causes accident (R7)			.627					
Coping strategy - use savings (SAV1)					.778			
coping strategy - save for low season (SAV2)					.842			
coping strategy - saving for emergency (SAV3)					.728			
coping strategy - cut expenses (MEX1)		.700						
coping strategy - postpone payment (MEX3)		.741						
coping strategy - borrow from family' friends in PP (EX2)								.876
coping strategy - borrow from financial institutions (EX4)								.859
coping strategy - advance from buyer (EX5)								.564
willing to take up course (WL1)						.901		
willing to take up industrial training (WL2)						.590		
Willing to spend time in gaining knowledge (WL3)						.917		
Willing to find ways to increase income (WV1)	.842							

willing to find ways of improving income if income is not enough (WV2)	.789							
willing to find stable side income (WV3)	.847							
willing to increase number of working days (WL4)	.762							

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

4. Internal consistency

As mentioned, the main aim of EFA is to produce a valid and reliable research tool. As mentioned in the previous sections, reliability test was done through the Cronbach's alpha reading, i.e. alpha value has to be above 0.70. A few items were dropped during the reliability tests as presented earlier. At this point, when the same set of data were loaded for EFA, a few more items were dropped due to its low loading value (i.e. below 0.4). When this was done, reliability test was re-run, followed by normality test, and EFA. This repetitive process was deemed necessary to achieve the main aim of EFA, i.e. to improve the reliability and validity of the research tool.

5. Interpretation / Result

After scrutinizing data screening process, reliability test and validity test, the research tool now consisted of twenty-nine Likert-scale questions and two categorical questions, excluding demographic, income versus expenses and trend of output. The twenty-nine questions were loaded into eight components, which represented eight variables. Refer to LSDF (Figure 2.7).

Table 5.8 presents the changes to the affected variables after items excluded in the rotated table was removed. With all these tests and results, the research then proceeded with testing each hypothesis using items which had passed all tests.

Table 5. 8: Changes to the affected variables after removing items through screening process

Variable	Number of items			
	Original (for data collection)	After reliability test	Items removed factor analysis	Remaining items
Income status	2			2
Coping Strategies – Savings	3			3
Coping Strategies – Mange Expenses	3	-1		2
Coping strategies – loan	4		-1	3
Coping strategies – subsidies	5	-1	-4	0
Risk	7	-1	-2	4
Livelihood Intensification	4	-1		3
Livelihood Diversification	4		-1	3
Willingness to learn	4	-1		3
Willingness to venture	5		-1	4
Sustainable income	4			4

5.4 Respondents' profile

Overall, as mentioned in Chapter 3, the sample size of 164 was achieved through printed survey questionnaires. The following subsections represent some statistical data representing the respondents' profile.

Table 5. 9: Respondents' profile

		Frequency	Valid Percent
Age group	21 and below	5	3.0
	22 to 34	42	25.6
	35 to 44	55	33.5
	45-54	30	18.3
	55-65	27	16.5
	66 and above	5	3.0
Gender	Male	150	91.5
	Female	14	8.5
	Total	164	100.0
Marital Status	Single	23	14.0
	Married	134	81.7
	Divorced	7	4.3
	Total	164	100.0
Race	Malay	149	90.9
	Chinese	6	3.7
	Indian	9	5.5
Education level	Illiterate	5	3.0
	Primary School	60	36.6
	SRP / PMR	40	24.2
	SPM	54	32.9
	Higher Education	5	3.0
Level of involvement in fishing activities	Full time	125	76.2
	Part time	39	23.8

5.4.1 Age Group

Table 5.9 showed that out of 164 respondents, 5 (3%) are below 21 years old, 42 (25.6%) falls between 22 years old and 34 years old, 55 (33.5%) between 35 to 44 years old, 30 (18.3%) between 45 to 54 years old, 27 (16.5%) between 55 to 65 years old and the remaining 5 (3%) are 66 years old and above. In other words, majority of the respondents are between the age of 22 to 44 years old (59.1%).

5.4.2 Gender

Majority of the respondents, i.e. 150 (91.5%) are male fishermen while only 14 (8.5%) were their female counterpart. This frequency might not be a good representation in many researches, but it is not the case in the fishing industry. A research done by Yahaya (2015) showed that even though it seemed to be unfair that contribution of women in the small-scale fisheries were being undermined, but the truth was a majority of the women in the small-scale fisheries industries in Malaysia were not fishermen, majority of them were involved in the traditional subsistence activities such as fish processing or preservation, and aquaculture activities such as mussel or oyster collection. The target respondents of this research were coastal fishermen, therefore, it was acceptable that majority of the respondents were males, instead of females.

5.4.3 Marital Status

The table also shows that majority of the respondents, i.e. 134 (81.7%) were married followed by 23 (14%) single and only 7 (4.3%) divorce. It is to be noted that by comparing this statistic and the gender statistic, it revealed that the majority of the respondents were males, and were the breadwinners of their families.

5.4.4 Race

As reflected in Table 5.9, a majority of the respondents were Malays, i.e. 149 or 90.9% of the total respondents, followed by merely 6 Chinese and 9 Indian respondents. This representation is valid as the majority of the coastal fishermen were Malays, while the Chinese and Indian fishermen were mostly employed in the big fishing boats, or were the owners of the big fishing boats, i.e. they carry out fishing activity beyond the coastal area.

5.4.5 Education Level

Table 5. 10: Education Level versus Age Group

		Age Group						
		<=21	22-34	35-44	45-54	55-64	>=65	Total
Education Level	Illiterate	0	0	0	1	2	2	5
	Primary School	0	7	14	13	23	3	60
	SRP / PMR	2	7	20	9	2	0	40
	SPM	3	24	20	7	0	0	54
	Higher Education	0	4	1	0	0	0	5
Total		5	42	55	30	27	5	164

As shown in Table 5.10, only a small minority of the respondents were illiterate, i.e. 5 (3%) or had the chance to complete tertiary education, i.e. 5 (3.0%) respondents. One third of the respondents had gone through primary school, i.e. 60 (36.6%), 40 respondents completed PMR/SRP (24.2%) while the remaining 54 respondents (32.9%) completed SPM.

When the researcher compared this statistic with that of age group, the researcher discovered that the illiterate respondents were those more than 45 years old, while the majority of the fishermen who had completed higher / tertiary education were those who were between the age group of 22 to 34 years old. At the same time, most of the younger fishermen, i.e. age below 44 years old, had at least completed their high school education, i.e. SPM. This showed that the younger generation of fishermen were somewhat educated. This discovery will be useful in the later discussion.

5.4.6 Level of involvement in fishing activities

Table 5.9 presents the respondents' level of involvement in fishing activities, i.e. full time or part time. The majority of the fishermen, i.e. 125 (76.2%) of the respondents were full time fishermen, while the remaining quarter were part time fishermen. Therefore, this is a good representation in the study of how coastal fishing activities contributed to sustainable income.

5.4.7 Income level

The statistics showed that the mean value for maximum income per month was RM1267.27, while the median value was RM1000.00. On the other end, the mean value for minimum income per month was RM563.03 while the median value was RM600.00. Based on Figure 5.2 and Figure 5.3, the mean and median values for maximum income per month did represent the entire sample, while the mean value for minimum income per month might not. This statistic would not have any impact on the results of this research as there were other questions being asked to test the trend of income status. The average income per month was not asked as the Phase 1 of data collection showed that the majority

of the respondents were not able to estimate the value due to the nature of this career, i.e. affected by many predictable as well as unpredictable factors.

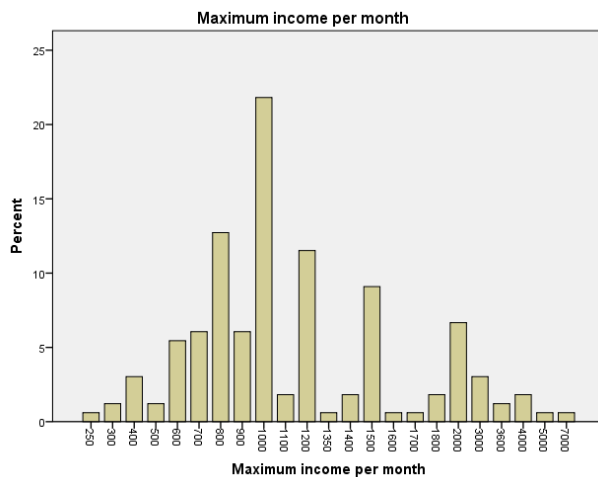


Figure 5. 2: Maximum income per month

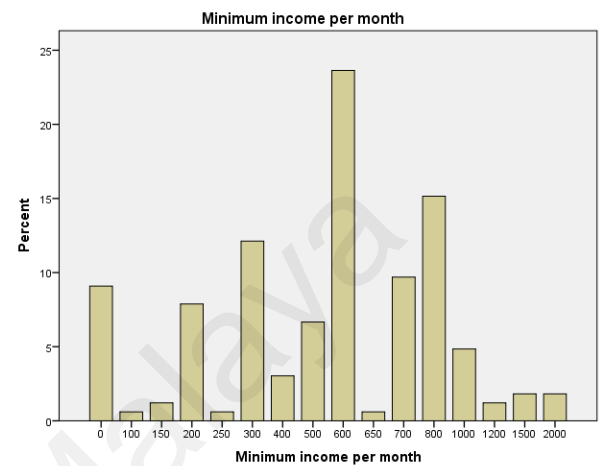


Figure 5. 3: Minimum income per month

5.5 Statistical Data Analysis

According to Cooper and Schindler (1998), statistical data analysis will result in reducing the accumulated data to a manageable size, and from there summaries can be developed, patterns can be revealed, and hypotheses can be tested.

Therefore, to answer the three research questions and to test the twenty-one hypotheses, both the SPSS and AMOS Design version 20 were used. SPSS was used to check assumptions, to carry out Cronbach's alpha reliability tests, to run EFA and correlation tests. These processes had been reported in the previous sections.

In this section, the researcher will focus on reporting the following analysis process, which includes the eight variables which have pass through EFA, i.e. result of SEM:

- a. Goodness of fit for each measure
- b. Developing the structural model

5.5.1 Measurement model – Confirmatory Factor Analysis Approach

In this phase of analysis, single construct measurement (measurement model) was conducted, whereby all six constructs were individually examined for the adequate measurement model. The following measures of goodness of fit and its acceptable threshold were employed to decide whether the model was acceptable.

Table 5. 11: Fit indexes and their acceptable threshold

Type of Indices	Fit index	Name	Acceptable Threshold
Absolute fit Indices	K^2	Chi-square	Insignificant p value of >0.05
	K^2/df	Relative chi-square	Values lesser than 5
Incremental Fit Indices	RMSEA	Root Mean Square Error of Approximation	Values lesser than 0.08
	NFI	Normed Fit Index	Values more than 0.90
	TLI	Tucker-Lewis Index	Values more than 0.90
	CFI	Comparative Fit Index	Values more than 0.90

a. Measurement model of coping strategies

Figure 5.4 shows the three indicators (observed variables) for savings, two indicators (observed variables) for managing expenses and three indicators (observed variables) for external help.

This construct was used to test the three hypotheses (H3a to H3c) that coping strategies was a three-factor structure comprising savings (SAV), managing expenses (ME) and external help (EH).

Before discussion on the model fitting results, it will be good to look into how this measurement model was constructed.

- i. There were three coping strategies (labelled as Coping) factors, as indicated by the three ellipses, i.e. savings (labelled as SAV), managing expenses (labelled as ME) and external help (labelled as EH).
- ii. There were eight observed variables in total, as indicated by the eight rectangles.
- iii. All eight observed variables were loaded on the factors in the following pattern: SAV1, SAV2 and SAV3 loaded on Factor 1; MEX1 and MEX3 loaded on Factor 2; EH2, EH4 and EH5 loaded on Factor 3.
- iv. Each observed variable was loaded on one factor only.
- v. Errors of variances associated with each observed variable were uncorrelated.

Table 5.12 shows the goodness of fit result for the construct of coping strategies. Based on Table 5.12, this measurement model yielded a χ^2 with insignificant p -value and a relative chi-square (χ^2/df) of 1.583. Other goodness of fit indices related to this measurement model includes: NFI (.941), TLI (.962), CFI (.977) and RMSEA (.060). In other words, this measurement model has surpassed five out of six minimum acceptable levels. Therefore, the model has yield reasonable values for a good fit, it is possible to regard this model as an acceptable fit.

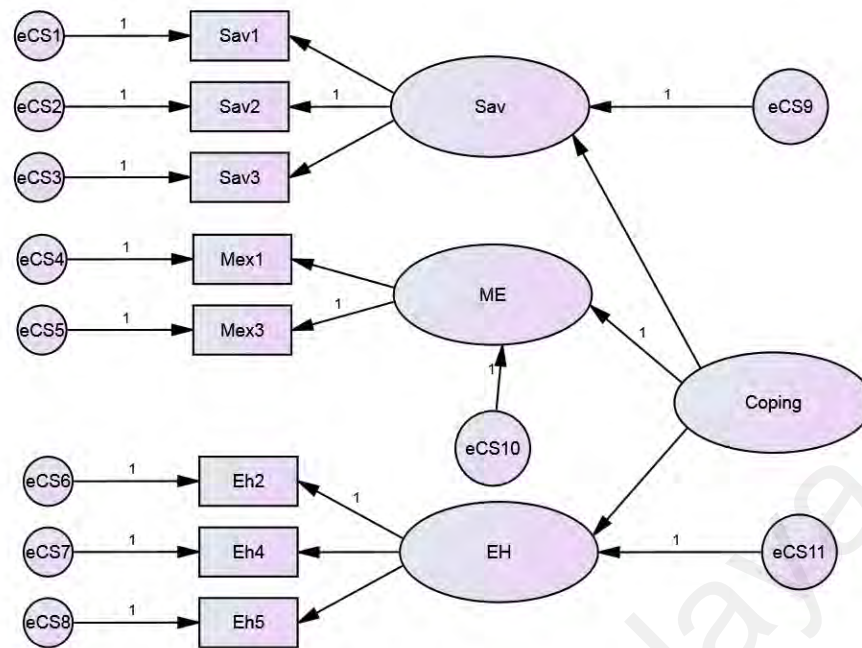


Figure 5. 4: Measurement Model of Coping Strategies

Table 5. 12: Model Fitting Results for Coping Strategies

Measures of fit	Chi-square (K ²) (p-value)	Relative chi-square	NFI	TLI	CFI	RMSEA
Coping Strategies	0.59	1.583	.941	.962	.977	.060

b. Measurement model of risk associated to fishing activities

Figure 5.5 shows the indicators (observed variables) for risk associated to fishing activities. This model does not aim to test any hypothesis, but it is used to test the goodness of fit of this construct.

Before discussing the result of the fit indices, it is good to look into how this measurement model or construct was formed.

- i. There is only one unobserved variable, i.e. Risk, as indicated by the one ellipse.

- ii. There were four observed variables, as indicated by the six rectangles.
- iii. All the observed variables (i.e. R4, R5, R6, R7) were loaded on one factor.
- iv. Errors of variances associated with each observed variable were uncorrelated.

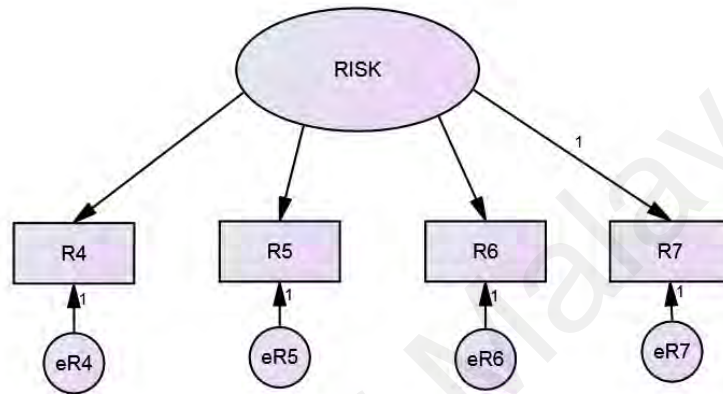


Figure 5. 5: Measurement Model of Risk associated to fishing activities

Table 5.13 shows the goodness of fit result for the construct of risk associated to fishing activities. This particular measurement model yielded a χ^2 with insignificant p -value and a relative chi-square (χ^2/df) of 1.065. Other goodness of fit indices related to this measurement model includes: NFI (.985), TLI (.997), CFI (.999) and RMSEA (.020). In other words, this measurement model had surpassed all the minimum acceptable level.

Table 5. 13: Model Fitting Results for Risk Associated to Fishing Activities

Measures of fit	Chi-square (K^2) (<i>p</i> -value)	Relative chi-square	NFI	TLI	CFI	RMSEA
Risk associated to fishing activities	.345	1.065	.985	.997	.999	.020

c. Measurement model of Livelihood Intensification

Figure 5.6 shows the indicators (observed variables) for livelihood intensification. It is important to note that this measurement does not aim to test any hypothesis, but to test goodness of fit only.

Before discussing the output of goodness of fit test, let's look into how this measurement model was constructed.

- i. There was only one unobserved variable, i.e. livelihood intensification (labelled as INT), as indicated by the one ellipse.
- ii. There were three observed variables, as indicated by the three rectangles.
- iii. All the observed variables (i.e. INT1, INT2 and INT3) were loaded on one factor.
- iv. Errors of variances associated with each observed variable were uncorrelated.

Construct livelihood intensification measurement model is shown in Figure 5.6. Standardized factor loadings or standardized validity co-efficiency are shown in Figure 5.6 as well.

Table 5.14 shows the goodness of fit result for the construct of risk associated to fishing activities. This particular measurement model yielded a K^2 with significant *p*-value and a relative chi-square (K^2/df) of 4.754. Other goodness of fit indices related to this measurement model includes: NFI (.983), TLI (.958), CFI (.986) and RMSEA (.051). In other words, this measurement model has surpassed all five out of six minimum

acceptable levels. Therefore, the model has yield reasonable values for a good fit, it is possible to regard this model as an acceptable fit.

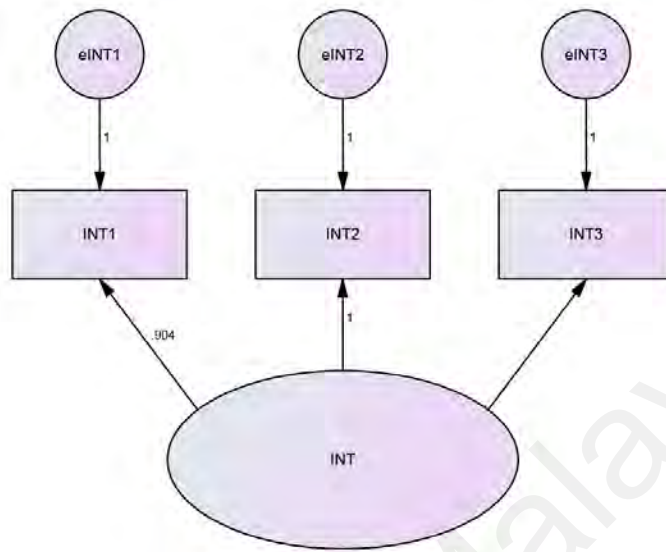


Figure 5. 6: Measurement Model of Livelihood Intensification

Table 5. 14: Model Fitting Results for Livelihood Intensification

Measures of fit	Chi-square (K ²) (p-value)	Relative chi-square	NFI	TLI	CFI	RMSEA
Livelihood Intensification	.029	4.754	.983	.958	.986	.051

d. Measurement model of Livelihood Diversification

Figure 5.7 shows the indicators (observed variables) for livelihood diversification. Note that this measurement does not aim to test any hypothesis, but to test goodness of fit only.

Before discussing the output of goodness of fit test, let's look into how this measurement model was constructed.

- i. There was only one unobserved variable, i.e. livelihood diversification (labelled as DIV), as indicated by the one ellipse.
- ii. There were three observed variables, as indicated by the three rectangles.
- iii. All the observed variables (i.e. DIV1, DIV2 and DIV3) were loaded on one factor.
- iv. Errors of variances associated with each observed variable were uncorrelated.

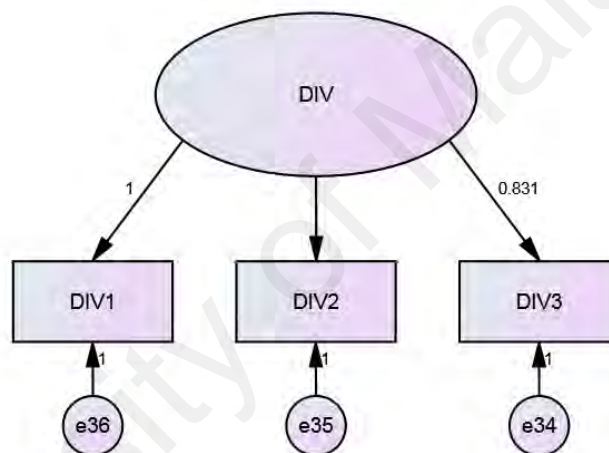


Figure 5. 7: Measurement Model of Livelihood Diversification

Table 5.15 shows the goodness of fit result for the construct of risk associated to fishing activities. This particular measurement model yielded a χ^2 with insignificant p -value and a relative chi-square (χ^2/df) of .555. Other goodness of fit indices related to this measurement model includes: NFI (.995), TLI (1.013), CFI (1.000) and RMSEA (.000). In other words, this measurement model has surpassed all the minimum acceptable levels.

Table 5. 15: Model Fitting Results for Livelihood Diversification

Measures of fit	Chi-square (K ²) (p-value)	Relative chi-square	NFI	TLI	CFI	RMSEA
Livelihood Intensification	.456	.555	.995	1.013	1.000	.000

e. Measurement model of Sustainable income

Figure 5.8 shows the indicators (observed variables) for sustainable income. Note that this measurement does not aim to test any hypothesis, but to test goodness of fit only.

Before discussing the output of goodness of fit test, let's look into how this measurement model was constructed.

- i. There was only one unobserved variable, i.e. sustainable income (labelled as SI), as indicated by the one ellipse.
- ii. There were four observed variables, as indicated by the four rectangles.
- iii. All the observed variables (i.e. SI1, SI2, SI3, and SI4) were loaded on one factor.
- iv. Errors of variances associated with each observed variable were uncorrelated.

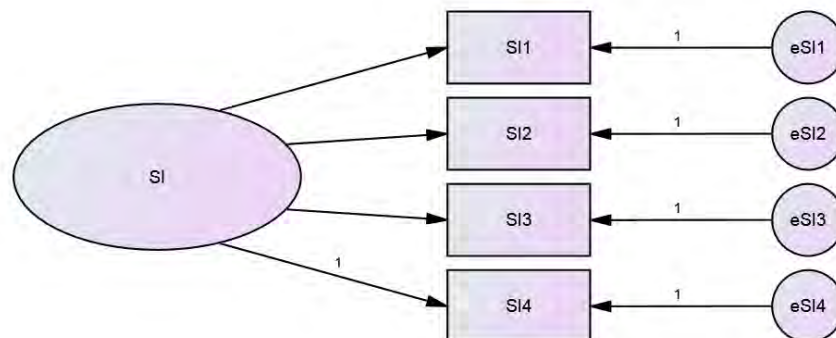


Figure 5. 8: Measurement Model of Sustainable Income

Table 5.16 shows the goodness of fit result for the construct of sustainable income. The standardized validity coefficient is shown in Figure 5.21, i.e. figures on top of each arrow.

This particular measurement model yielded a χ^2 with significant p -value and relative chi-square (χ^2/df) of 4.407. Other goodness of fit indices related to this measurement model includes: NFI (.943), TLI (.857), CFI (.952) and RMSEA (.064). In other words, this measurement model has surpassed four out of six minimum acceptable levels of fit indices. Therefore, the model has yield reasonable values for a good fit, it is possible to regard this model as an acceptable fit.

Table 5. 16: Model Fitting Results for Sustainable Income

Measures of fit	Chi-square (K^2) (p -value)	Relative chi-square	NFI	TLI	CFI	RMSEA
Sustainable Income	.004	4.407	.943	.857	.952	.064

f. Measurement model of Willingness to Learn

Figure 5.9 shows the three indicators (observed variables) for willingness to learn. Note that this measurement model does not aim to test any hypothesis, but to test goodness of fit only.

Before discussion on the model fitting result, it will be good to look into how this measurement model was constructed.

- i. There was only one unobserved variable, i.e. willingness to learn (labelled as WL), as indicated by the one ellipse.
- ii. There were three observed variables, as indicated by the three rectangles.
- iii. All the observed variables (i.e. WL1, WL2, and WL3) were loaded on one factor.
- iv. Errors of variances associated with each observed variable were uncorrelated.

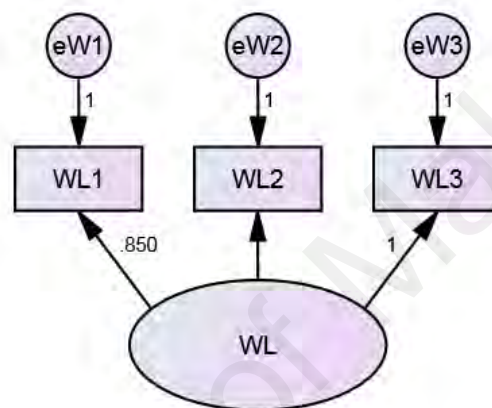


Figure 5. 9: Measurement Model of Willingness to Learn

Table 5.17 shows the goodness of fit result for the construct of willingness to learn. Based on Table 5.17, this measurement model yielded a χ^2 of .999 with insignificant p -value and chi-square (χ^2/df) of .000. Other goodness of fit indices related to this measurement model includes: NFI (1.000), TLI (1.013), CFI (1.000) and RMSEA (.000). In other words, this measurement model has surpassed all the minimum acceptable levels.

Table 5. 17: Model fitting results for willingness to learn

Measures of fit	Chi-square (K ²) <i>p</i> -value	Relative chi-square	NFI	TLI	CFI	RMSEA
Coping Strategies	.999	.000	1.000	1.013	1.000	.000

g. Measurement model of Willingness to Venture

Figure 5.10 shows the four indicators (observed variables) for willingness to venture. Note that this measurement model does not aim to test any hypothesis, but to test goodness of fit only.

Before discussion on the model fitting result, it will be good to look into how this measurement model was constructed.

- i. There was only one unobserved variable, i.e. willingness to learn (labelled as WV), as indicated by the one ellipse.
- ii. There were four observed variables, as indicated by the four rectangles.
- iii. All the observed variables (i.e. WV1, WV2, WL3, and WV3) were loaded on one factor.
- iv. Errors of variances associated with each observed variable were uncorrelated.

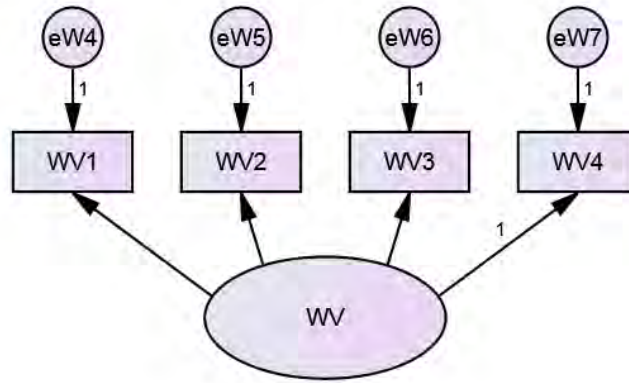


Figure 5. 10: Measurement Model of Willingness to Venture

Table 5.18 shows the goodness of fit result for the construct of willingness to learn. Based on Table 5.18, this measurement model yielded a χ^2 with insignificant p -value and a relative chi-square (χ^2/df) of .150. Other goodness of fit indices related to this measurement model includes: NFI (.999), TLI (1.017), CFI (1.000) and RMSEA (.000). In other words, this measurement model has surpassed all the minimum acceptable levels.

Table 5. 18: Model Fitting Results for Willingness to Venture

Measures of fit	Chi-square (χ^2) (p -value)	Relative chi-square	NFI	TLI	CFI	RMSEA
Coping Strategies	.861	.150	.999	1.017	1.000	.000

5.5.2 Structural Model

While the measurement model focused on the relationships between the observed and unobserved (latent) variables, the structural model will focus on the relationship between the constructs or the measurement models formed.

The seven measurement models (i.e. constructs) which had gone through EFA, reliability test as well as goodness of fit tests were linked to form the conceptual model. In the SEM analysis, this conceptual model is referred to as the structural model. The model was loaded onto AMOS version 20 to be tested. The objective of this structural model testing was to test the five hypotheses (H3 to H7) and the LSD model fit. H1 and H2 could not be loaded or tested through this method as all the items involved in socio-demographic factors were nominal variables.

Figure 5.11 shows all the observed variables and unobserved variables involved in LSDF less socio-demographic, i.e. phase 1 of LSDF.

As mentioned, this structural model was used to test the five hypotheses and three sub-hypotheses (refer to the previous sections for details of hypotheses).

Before discussion on the output of structural model testing, it will be good to look into how this structural model was constructed.

- i. There were five factors contributing to livelihood strategies (i.e. livelihood intensification which was labelled as INT and livelihood diversification which was labelled as DIV), which includes risk associated to fishing (Risk), coping strategies (Coping), willingness to learn (WL) and willingness to venture (WV). All these seven unobserved variables are indicated by seven ellipses

- ii. There were all together thirty-four observed variables, as indicated by thirty-four rectangles.
- iii. All endogenous variables were correlated as suggested by AMOS.
- iv. Each observed variable loaded on one factor only.
- v. Errors variances associated with each observed variable were uncorrelated.

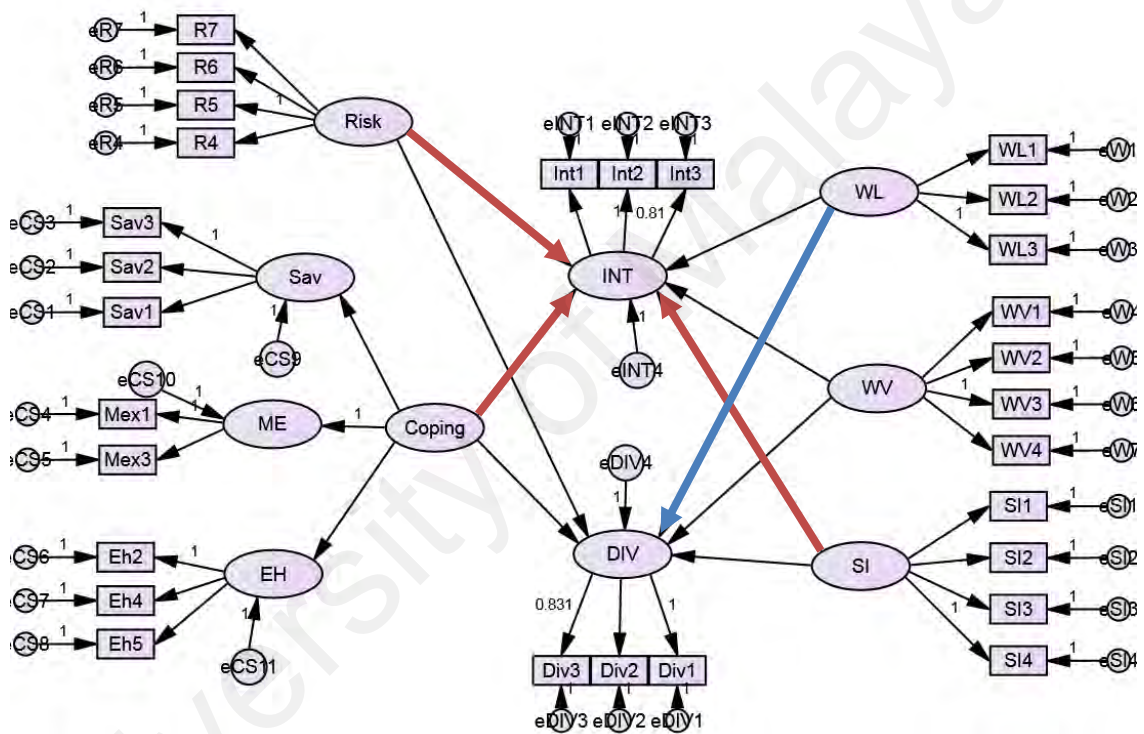


Figure 5. 11: Structural model for LSDF (excluding nominal variables)

Table 5.19 shows the goodness of fit results for the structural model for LSD Framework. Based on Table 5.19, this structural model yielded a χ^2 with significant p -value and a relative chi-square (χ^2/df) of 1.445. Other goodness of fit indices related to this measurement model includes: NFI (.775), TLI (.907), CFI (.916) and RMSEA (.052).

In other words, this structural model has surpassed four out of six minimum acceptable levels. Therefore, the model has yield reasonable values for a good fit, it is possible to regard this model as an acceptable fit.

Table 5. 19: Model Fitting Results for Willingness to Venture

Measures of fit	Chi-square (K ²) (<i>p</i> -value)	Relative chi-square	NFI	TLI	CFI	RMSEA
Coping Strategies	.861	.150	.999	1.017	1.000	.000

5.5.3 Result of Hypotheses Testing (Hypothesis 3 to Hypothesis 7)

As mentioned earlier, Hypothesis 3 to Hypothesis 7 were tested using the structural model to identify how the constructs were related to each other. Table 5.20 summarises the standardized coefficients from the estimated structural model along with relevant *p*-value.

Table 5. 20: Summary of the Hypothesis 3 to Hypothesis 7 Posited by LSDF

Hypothesis	Hypothesized Paths	Standardized coefficient	<i>p</i> -value	Test results
H3a	Coping strategies → Livelihood intensification	.187	***	Accepted
H3b	Coping strategies → Livelihood diversification	.125	.307	Not accepted
H4a	Risk → Livelihood intensification	.107	***	Accepted

Hypothesis	Hypothesized Paths	Standardized coefficient	p-value	Test results
H4b	Risk → Livelihood diversification	.122	.705	Not accepted
H5a	Sustainable income → Livelihood intensification	.077	***	Accepted
H5b	Sustainable income → Livelihood diversification	.091	.196	Not accepted
H6a	Willingness to learn → Livelihood intensification	.048	.475	Not accepted
H6b	Willingness to learn → Livelihood diversification	.064	***	Accepted
H7a	Willingness to venture → Livelihood intensification	.069	.606	Not accepted
H7b	Willingness to venture → Livelihood diversification	.088	.562	Not accepted

5.5.4 Correlation Test for Nominal Variables

Due to the limitation of AMOS Design, i.e. nominal data is not recognized by the system. Therefore, as mentioned, the researcher had done correlation test for nominal variables through SPSS instead. The following are the results of testing Hypothesis 1 and Hypothesis 2 using SPSS.

a. Relationship between age group and livelihood intensification

A correlation analysis was run to determine the relationship between age group with livelihood intensification. The results presented in Table 5.21 showed that there was no significant relationship between age group and livelihood intensification where $p < 0.05$. Therefore, age group did not significantly predict the level of livelihood intensification. This hypothesis is not accepted. From the Table 5.21, the result showed

that the relationship between age with livelihood intensification is not significant at $r=0.024$, $p>0.05$.

Table 5. 21: Relationship between Age group and Livelihood intensification

		Age Group	Livelihood intensification
Age Group	Pearson Correlation	1	.240
	Sig. (2-tailed)		.045
	N	164	164
Livelihood intensification	Pearson Correlation	.240	1
	Sig. (2-tailed)	.045	
	N	164	164

b. Relationship between age and diversification strategy

Another correlation analysis was run to determine the relationship between age group with livelihood diversification. The results presented in Table 5.22 showed that there is no significant relationship between age group and livelihood diversification where $p > 0.05$. Therefore, age group did not significantly predict the level of livelihood diversification as well. This hypothesis is not accepted. From the Table 5.22, result showed that the relationship between age with livelihood diversification is not significant at $r=.412$, $p>0.05$.

Table 5. 22: Relationship Between Age and Livelihood Diversification

		Correlations	
		Age Group	Livelihood diversification
Age Group	Pearson Correlation	1	.064
	Sig. (2-tailed)		.412
	N	164	164
Livelihood diversification	Pearson Correlation	.064	1
	Sig. (2-tailed)	.412	
	N	164	164

c. Relationship between household size and livelihood intensification

The third correlation analysis was run to determine the relationship between household size and livelihood intensification. The results presented in Table 5.23 showed that there was no significant relationship between household size and livelihood intensification where $p > 0.05$. Therefore, household size did not significantly predict the level of livelihood intensification as well. This hypothesis is not accepted. From the Table 5.23, the result showed that the relationship between age with livelihood diversification is not significant at $r=.683$, $p>0.05$.

Table 5. 23: Relationship Between Household Size and Livelihood Intensification

		Correlations	
		Household Size	Livelihood intensification
Household size	Pearson Correlation	1	-.032
	Sig. (2-tailed)		.683
	N	164	164
Livelihood intensification	Pearson Correlation	-.032	1
	Sig. (2-tailed)	.683	
	N	164	164

d. Relationship between household size and livelihood diversification

The fourth correlation analysis was run to determine the relationship between household size and livelihood diversification. The results presented in Table 5.24 showed that there was no significant relationship between household size and livelihood diversification where $p > 0.05$. Therefore, household size did not significantly predict the level of livelihood diversification as well. This hypothesis is not accepted. From the Table 5.24, the results showed that the relationship between age with livelihood diversification is not significant at $r=.970, p>0.05$.

Table 5. 24: Relationship Between Household Size and Livelihood Diversification

Correlations			
		Household size	Livelihood diversification
Household size	Pearson Correlation	1	.003
	Sig. (2-tailed)		.970
	N	164	164
Livelihood diversification	Pearson Correlation	.003	1
	Sig. (2-tailed)	.970	
	N	164	164

e. Relationship between level of education and livelihood intensification

The next correlation analysis was run to determine the relationship between level of education and livelihood intensification. The results presented in Table 5.25 showed that there was a significant relationship between level of education and livelihood intensification where $p < 0.05$. Therefore, level of education did significantly predict the level of livelihood diversification as well. This hypothesis is accepted. From the Table 5.25, the results showed that the relationship between the level of education and livelihood intensification was significant at $r=.252, p<0.05$.

Table 5. 25: Relationship Between Level of Education and Livelihood**Intensification****Correlations**

		Livelihood intensification	Level of education
Livelihood intensification	Pearson Correlation	1	.252**
	Sig. (2-tailed)		.001
	N	164	164
Level of education	Pearson Correlation	.252**	1
	Sig. (2-tailed)	.001	
	N	164	164

f. Relationship between level of education and livelihood diversification

The sixth correlation analysis was run to determine the relationship between level of education and livelihood diversification. The results presented in Table 5.26 showed that there was a significant relationship between level of education and livelihood diversification where $p < 0.05$. Therefore, level of education did significantly predict the level of livelihood diversification as well. This hypothesis is accepted. From the Table 5.26, the results showed that the relationship between level of education and livelihood diversification was significant at $r=.398$, $p<0.05$.

Table 5. 26: Relationship Between Level of Education and Livelihood**Diversification****Correlations**

		Level of education	Livelihood diversification
Level of education	Pearson Correlation	1	.398**
	Sig. (2-tailed)		.000
	N	164	164
Livelihood diversification	Pearson Correlation	.398**	1
	Sig. (2-tailed)	.000	
	N	164	164

g. Relationship between income versus and livelihood intensification

The seventh correlation analysis was run to determine the relationship between income versus expenses and livelihood intensification. The results presented in Table 5.27 showed that there was a significant relationship between income versus expenses and livelihood intensification where $p < 0.05$. Therefore, level of income as compared to expenses did significantly predict the level of livelihood intensification as well. This hypothesis is accepted. From the Table 5.27, the results showed that the relationship between income versus expenses and livelihood intensification was significant at $r=.290$, $p<0.05$.

Table 5. 27: Relationship Between Income Versus Expenses and Livelihood Intensification

		Livelihood intensification	Income versus expenses
Livelihood intensification	Pearson Correlation	1	.290**
	Sig. (2-tailed)		.000
	N	164	164
Income versus expenses	Pearson Correlation	.290**	1
	Sig. (2-tailed)	.000	
	N	164	164

h. Relationship between income versus expenses and livelihood diversification

The eight-correlation analysis was run to determine the relationship between income versus expenses and livelihood diversification. The results presented in Table 5.28 showed that there was a significant relationship between income versus expenses and livelihood diversification where $p < 0.05$. Therefore, level of income as compared to

expenses did significantly predict the level of livelihood diversification as well. This hypothesis is accepted. From the Table 5.28, the results showed that the relationship between income versus expenses and livelihood diversification was significant at $r=.426$, $p<0.05$.

Table 5. 28: Relationship Between Income Versus Expenses and Livelihood

Diversification

Correlations

		Income versus expenses	Livelihood diversification
Income versus expenses	Pearson Correlation	1	.426**
	Sig. (2-tailed)		.000
	N	164	164
Livelihood diversification	Pearson Correlation	.426**	1
	Sig. (2-tailed)	.000	
	N	164	164

i. Relationship between trend of output and livelihood intensification

The ninth correlation analysis was run to determine the relationship between the trend of output and livelihood intensification. The results presented in Table 5.29 showed that there was a significant relationship between trend of output and livelihood intensification where $p < 0.05$. Therefore, the trend of output did significantly predict the level of livelihood intensification as well. This hypothesis is accepted. From the Table 5.29, the results showed that the relationship between trend of output and livelihood intensification was significant at $r=.227$, $p<0.05$.

Table 5. 29: Relationship Between Trend of Output and Livelihood Intensification

		Correlations	
		Trend of output	Livelihood intensification
Trend of output	Pearson Correlation	1	.227**
	Sig. (2-tailed)		.003
	N	164	164
Livelihood intensification	Pearson Correlation	.227**	1
	Sig. (2-tailed)	.003	
	N	164	164

j. Relationship between trend of output and livelihood diversification

The final correlation analysis was run to determine the relationship between the trend of output and livelihood diversification. The results presented in Table 5.30 showed that there was a significant relationship between the trend of output and livelihood diversification where $p < 0.05$. Therefore, the trend of output did significantly predict the level of livelihood diversification as well. This hypothesis is accepted. From the Table 5.30, the results showed that the relationship between the trend of output and livelihood diversification was significant at $r=.521$, $p<0.05$.

Table 5. 30: Relationship Between Trend of Output and Livelihood Diversification

		Correlations	
		Trend of output	Livelihood diversification
Trend of output	Pearson Correlation	1	.521**
	Sig. (2-tailed)		.000
	N	164	164
Livelihood diversification	Pearson Correlation	.521**	1
	Sig. (2-tailed)	.000	
	N	164	164

5.5.5 Result of Hypotheses testing (Hypothesis 1 and Hypothesis 2)

The following table summarizes the results of the correlation analysis presented in the previous section.

Table 5. 31: Summary of the Hypothesis 1 and Hypothesis 2 Posited by LSDF

Hypothesis	Hypothesized Paths	R-value	<i>p</i> -value	Test results
H1a	Age group → livelihood intensification	.024	<i>p</i> >.05	Not Accepted
H1b	Age group → livelihood diversification	.412	<i>p</i> >.05	Not accepted
H1c	Household size → livelihood intensification	.683	<i>p</i> >.05	Not accepted
H1d	Household size → livelihood diversification	.970	<i>p</i> >.05	Not accepted
H1e	Level of education → livelihood intensification	.252	<i>p</i> <.05	Accepted
H1f	Level of education → livelihood diversification	.398	<i>p</i> <.05	Accepted
H2a	Income versus expenses → livelihood intensification	.290	<i>p</i> <.05	Accepted

Hypothesis	Hypothesized Paths	R-value	<i>p</i> -value	Test results
H2b	Income versus expenses → livelihood diversification	.426	<i>p</i> <.05	Accepted
H2c	Trend of output → livelihood intensification	.227	<i>p</i> <.05	Accepted
H2d	Trend of output → livelihood diversification	.521	<i>p</i> <.05	Accepted

5.6 Summary

The major findings of quantitative survey demonstrate that (1) education level, level of income versus expenses, trend of output, coping strategies adopted, risk associated to fishing activities and fishermen view of sustainable income are significant factors affecting fishermen choice of livelihood intensification strategy, while (2) education level, level of income versus expenses, trend of output, and willingness to learn are significant factors affecting their choice of livelihood diversification strategy. Besides, survey also shows a significant relationship between livelihood intensification strategy and livelihood outcome.

CHAPTER 6 DISCUSSION AND POLICY IMPLEMENTATION

6.1 Introduction

This chapter will examine the achievements of this research and compare these achievements with the research objectives stated in Chapter 1. Then this chapter will continue with the discussion on the feasibility of applying LSDF, and outline the guidelines involved in the implementation of the said framework.

6.2 Achievement of Research Aims and Objectives

This thesis explored the LSDF from the perspective of coastal fishermen of Pangkor Island, Malaysia. In the first part of the LSDF, it consisted of three broad criteria affecting the choice of livelihood strategies, and in the second part of LSDF, it consisted of how the choice of livelihood strategies and respondents' attitude, in terms of willingness to learn and willingness to venture might affect their view of sustainable income.

As stated in Chapter 1, this research consisted of four objectives: (1) To obtain basic understanding of Pangkor Island coastal fishermen with regards to their livelihood strategies, (2) To investigate the relationship between livelihood strategies and sustainable income of coastal fishermen on Pangkor Island, (3) To analyse the role of willingness to change in determining the choice of livelihood strategies, and (4) To provide recommendation regarding policy implementation to improve livelihood of coastal fishermen of Pangkor Island.

To achieve those research objectives, the following research questions were asked, (1) Is socio-demographic factor able to predict the choice of livelihood strategies? (2) Will trend of income and trend of output determine the choice of livelihood strategies?

(3) What are possible coping strategies adopted by the coastal fishermen in the case of insufficient income? (4) Will risk carried by fishermen affect their choice of livelihood strategies? (5) What is the relationship between the coastal fishermen aim of sustainable livelihood and the choice of livelihood strategies they have made? and (6) Will the willingness to change affect the choice of livelihood strategies made by coastal fishermen?

The research objectives were achieved and research questions were answered through several phases. Firstly, thorough literature mining and review was done by the researcher, which contributed to the source of secondary data. Literature review showed that sustainable income was one of the livelihood outcomes, of which was normally being addressed to through various sustainable livelihood frameworks. However, these complicated frameworks might not be entirely applicable to every community, depending on the characteristics of the community. On top of that, there was no standardized research tools available which could be applicable in various communities.

Therefore, the researcher did the second stage of the research, i.e. qualitative data collection. This phase was carried out to investigate the criteria which affected the coastal fishermen's decision on livelihood strategies. These two actions together with the conceptual framework generated from there allowed the researcher to briefly answer all the research questions.

However, to improve the validity of the findings generated from qualitative data, the researcher decided to convert the findings into quantitative research tool. This had subsequently brought the researcher to the final stage of research, i.e. quantitative data collection. Data collected from a larger sample size, i.e. 165, allowed the researcher to improve the validity of the findings from qualitative data, as well as the validity of the conceptual framework constructed.

In the next section, the researcher will discuss the results of hypotheses tests. Discussion is organized based on the research objectives mentioned.

6.3 Research Objective 1: To obtain basic understanding of Pangkor Island coastal fishermen with regards to their livelihood strategies

To achieve this research objective, external factors affecting the choice of livelihood strategies were identified. As mentioned in the previous chapter, these factors were first identified through qualitative data collection, whereby findings from this phase were used to form the quantitative research tool. Quantitative data collection phase was then employed to quantify significant factors contributing to the choice of livelihood strategies. The following five research questions were formed to achieve this research objective.

6.3.1 Socio-demographics variables as predictors of the choice of livelihood strategies

Hypothesis 1a: Age is a significant predictor of livelihood intensification

Based on Hypothesis 1a, it was concluded that there was an insignificant positive relationship between age and livelihood intensification. This result is different from research output found in Johnson (1997). According to these two researchers, elderly people tend to engage in activities they were familiar with and near to their residence. Furthermore, in China's traditional fishing villages, majority of the fishermen were between the age of 40 to 60 years old, while very few youngsters (age below 30 years old) were fishermen (Zhang, 2016). Another research done by Jeyarajah and Santhirasegaram (2015) on small scale fishermen in Sri Lanka had shown the same result, i.e. there was a

positive and significant relationship between age and sum of income generated from fishing activities. In other words, the older the fishermen, i.e. increase in years of fishing, the higher the level of livelihood intensification.

This result could be contributed by the measurement used in identifying the level of livelihood intensification. In this research, intensification was measured by the type of changes done throughout their profession as fishermen. The more changes done throughout indicated a higher level of livelihood intensification. Some of the experienced fishermen tended to focus on the fishing method, fishing area and targeted fishing output which they were familiar with, while others made use of the experience they had by trying different methods and exploring various areas. Hence, an insignificant result was shown.

Hypothesis 1b: Age is a significant predictor of livelihood diversification

This research showed an insignificant negative relationship between age and livelihood diversification, i.e. Hypothesis 1b was not accepted. This result was not consistent with previous research. According to Linus (2012), a fishermen research in Kenya showed a negative significant relationship between age and livelihood diversification, whereby the younger fishermen were able to enjoy the freedom of diverting their source of income as their commitment would be less as compared to their older counterparts. The same result was seen in a research done on fishermen in Bangladesh, whereby older fishermen had prevented diversification (Islam, 2013). This contradicting result could be contributed by the following reasons.

According to qualitative Findings 8, a majority of the fishermen were of the view that their livelihood will worsen in the future, and therefore, discouraged their children to be fishermen. In other words, most of the younger islanders might not fulfil the sampling criteria of this research, i.e. coastal fishermen. This was further confirmed by the age

group of the respondents in this research, whereby only 3% were below 21 years old and a total of one quarter below 35 years old. This was consistent with Senapati and Gupta (2012), a research done in India that showed a huge decline in younger aged fishermen as they had ventured into other industries.

On top of that, 77% of the respondents called themselves fulltime fishermen, hence were not seeking for other sources of income. Majority of the part time fishermen respondents were of the older group. This could be related to the retirement age, which varies from one individual to another. Hence, they might not want to seek for alternative source of income.

Hypothesis 1c: Household size is a significant predictor of livelihood intensification

Hypothesis 1d: Household size is a significant predictor of livelihood diversification

This research showed no significant relationship between household size and both livelihood strategies. Therefore, both Hypothesis 1c and Hypothesis 1d were rejected. The relationship between these two variables vary from one research to another.

According to Betcherman and Marschke (2016), there was no significant relationship between household size and fishing intensification among the Vietnamese fishermen. This was supported by Khan (2005), whereby an increase in the household size might not affect fishermen's choice of livelihood strategies even though it resulted in an increase in dependency problem. This is said to be plausible as other sources of income might be generated by other family members besides the respondents. This reason was consistent with that of coastal fishermen of Pangkor Island, which could be seen through qualitative research findings, i.e. fishermen's wives engaged in other industries.

However, other researchers reported that there was a significant relationship between household size and livelihood intensification. For example, according to Xu, Zhang, Rasul, Liu, Xie, Cao and Liu (2015) in their research in China, an increase in household size resulted in livelihood intensification. This result was supported by Mfinanga (2014), who carried out research on farmers in Tanzania, i.e. there was a positive relationship between forestry clearing for cultivation purposes and household size.

On the other hand, there were researchers who reported a significant relationship between household size and livelihood diversification. For example, a research carried out by Eneyew and Bekele (2008) in Ethiopia showed that household size had directly affected livelihood diversification due to the limitation of natural resources which had limited the intention of intensification. The same result was found in a research done on farmers in Nigeria (Matthews-Njoku & Nwaogwugwu, 2014) and Europe (Harjes, 2007).

Therefore, these results further supported the concept of sustainable livelihood, whereby factors affecting choice of livelihood strategies might vary from one community to another.

Hypothesis 1e: Education level is a significant predictor of livelihood intensification

Hypothesis 1f: Education level is a significant predictor of livelihood diversification

This research showed a positive and significant relationship between the level of education and livelihood intensification as well as livelihood diversification. Both results were consistent with many past researches.

Allison and Mvula (2002) reported in their studies on fishermen in Malawi that fishermen would always choose fishing as their last resort of occupation as they were not

exposed to high level of education. In other words, as fishermen were generally not well educated in Malawi, the level of livelihood intensification was said to be higher, i.e. more dependent on fishing activities. However, in the Malaysian context, eventhough most of the coastal fishermen had lower level of educational achievement, i.e. SPM and below, but there is still a positive relationship found between education level and livelihood intensification. This direct relationship between education level and livelihood intensification was mainly contributed by the fact that fishermen who were more educated were able to explore various way of fishing, and therefore were able to intensify.

A positive significant relationship between education level and livelihood diversification was widely supported by past research. For example, according to Fang et al. (2011), education level would significantly influence fishermen's choice of livelihood strategy in China. They further explained that well educated fishermen were in a better position in obtaining information on job opportunities available in other industries and they were also more competitive in the labour market, therefore, they had better opportunities to diversify. Another research done in South Africa showed that higher education level achieved by fishermen was able to reduce the barriers to enter into a higher return livelihood strategy, i.e. livelihood diversification (Alemu, 2012).

Therefore, the outcome of both hypotheses testing was well supported and consistent with research in other communities, particularly fishing community.

6.3.2 Trend of income and trend of output as predictors of the choice of livelihood strategies

Hypothesis 2a: There is a significant relationship between income versus expenses and livelihood intensification.

Hypothesis 2b: There is a significant relationship between income versus expenses and livelihood diversification.

Hypothesis 3a: There is a significant relationship between fishing output and livelihood intensification.

Hypothesis 3b: There is a significant relationship between fishing output and livelihood diversification.

This research accepted all the hypotheses mentioned above. In other words, there was a significant relationship between the level of income versus expenses and choice of livelihood strategies, and a significant relationship between fishing output and choice of livelihood strategies as well.

The test results of Hypothesis 2a and 2b showed that regardless of whether coastal fishermen chose to increase their involvement in fishing activities or diversify their source of income, as long as change was made, it would ultimately improve their ability to face ever increasing expenses and inflation rate. The same concept was found in the DFID and IDF sustainable framework. However, if livelihood intensification takes place, there is always an opportunity cost to it, i.e. trade off. As reported by the World Bank (2006), intensification might result in the trading off of environmental sustainability, over-specialization therefore lacks of flexibility, personal income and environmental benefits, etc. Further discussion will be done in the recommendation section.

Whereas, the test result of Hypothesis 3a and 3b showed that fishermen who had been gaining more consistent or larger amount of output over the years were those fishermen who had adopted livelihood intensification strategy. At the same time, fishermen who had seen an increase in the output gain were working harder towards obtaining sustainable income through livelihood diversification. This result was in line with the qualitative findings discussed earlier, whereby fishermen who believed in

“scratch in the morning, eat in the morning; scratch in the evening, eat in the evening” were comfortable with their current livelihood condition, even though it was filled with challenges, and were not motivated to apply any change in livelihood strategies.

However, it is important to note that this research showed a mean and median of minimum income level of RM563.03 and RM600.00 per month, which is way below the poverty cut off line of RM800 per month suggested by Malaysian Economic Planning report. In other words, the coastal fishermen were living below the poverty line during low-season. Furthermore, 50% of the respondents further explained that despite having inconsistent levels of income and the fact that they did save when there was excess daily income, but their savings was so low that it might not last them for more than one week if they did not generate any income, with only 8 out of the 164 respondents (less than 5%) agreeing that their daily savings could last them for two months. This is a worrying statement, especially when sustainability is of concern.

6.3.3 Type of coping strategies adopted by coastal fishermen

Coping strategies can be related to livelihood strategies, i.e. source of income. However, coping strategies are short term responses to a specific shock such as drought, instead of long-term source of finance. In such situations, it is important for the coastal fishermen to adopt the right strategy to go through the hard times.

This research showed that all three, i.e. digging from savings, managing expenses and seeking for external help, were the determinants of coping strategies. This result was in line with two other researches in the past.

Firstly, a research done in Tanzania showed that (1) reducing household expenses, including abandoning traditional ceremony, stopped paying school fees for children or reduced buying new items; (2) changes in food consumption, including eating wild fruits

or reducing number of meals; (3) selling household assets, including selling fishing equipment, furniture and jewellery; (4) dig from savings, including use savings to replace damaged fishing equipment; and lastly (5) getting loan from relatives or money lenders (Katikiro, 2014). The first three coping strategies were grouped in this research as managing expenses, i.e. independent variable of Hypothesis H3b, while the forth related to H3a and the fifth strategy related to H3c.

Secondly, an Asian research showed similar results. Research done by Muflikhati and Hernawati (2016) on small scale fishermen in South Korea showed 20 coping strategies adopted by the said group of fishermen. Five most prominent coping strategies included (1) changing cheaper dish, (2) reducing amount of rice that is eaten, (3) owe to stall, (4) indebted to family and friends, and (4) reducing the frequency of eating, while digging from savings is ranked as the 15th coping strategies adopted.

In conclusion, it is clear that coastal fishermen tended to adopt similar coping strategies regardless of where they were. This is deemed to be important due to the nature of their income, i.e. mostly inconsistent.

6.3.4 Coping strategies available and choice of livelihood strategies

Hypothesis 3a: There is a significant relationship between coping strategies and livelihood intensification

Hypothesis 3b: There is a significant relationship between coping strategies and livelihood diversification

As mentioned earlier, coping strategies are short term strategies to help an individual or household in going through particular shock, whereas adaptation strategies are long term strategies to anticipate a challenge and to facilitate long term growth

(Skinner, 1995). According to David (1993) coping strategies are adopted to respond to the decrease in income of food supply while adaptation strategies are used to buffer the household against future potential shocks and changes. In other words, coping strategies are corrective strategies while adaptive strategies are preventive moves. In this study, adaptation strategies are referred to as livelihood strategies.

In this research, the findings accepted Hypothesis 3a and rejected Hypothesis 3b. In other words, coastal fishermen who had applied livelihood intensification strategies had been adopting various coping strategies as well. However, when the fishermen were able to overcome shock or shortages of income, they might not adopt any livelihood diversification strategy, and vice versa.

According to Bene (2009), fishermen who had been struggling with decline in resources or income, would develop both coping and livelihood strategies. This is supported by another research done in Indonesia, whereby some of the fishermen in West Sumatra who faces a similar scenario seemed to diversify their livelihoods towards farming while most of them chose to intensify fishing activities (Yuerlita, 2013). Therefore, it is clear that the results of this current research have further confirmed the outcome of past researches.

Based on qualitative Findings 5, majority of the respondents mentioned that they had taken various steps in intensifying their fishing activities. For example, from working in big boat to operating their own *sampan*, from operating in one fishing area to various fishing areas, or from one fishing method to various ways of fishing. However, income was never enough to cope with the effect of inflation, i.e. increase of living expenses. At the same time Findings 6 showed that a majority of the coastal fishermen did not have extra resources to generate extra income from other sectors, i.e. diversify, but some of the fishermen mentioned that their wives or other family members were diversifying or had

been working fulltime in other industries to maintain sustainable source of income. This particular information was not captured in the quantitative data collection phase as they were not the targeted sample of this research, but it worked as the supportive information to explain the outcome of Hypothesis 3a and 3b tests.

Another scenario worth noting is the fact that coping strategies is indeed important for survival in the short term, but it will usually diminish assets necessary for adaptation and lead to lower levels of well beings' overtime (Skinner, 1995). The same trends can be seen in this research. For example, one of the main coping strategies adopted was to dig from savings. If this scenario continues, the fishermen will continue to face the problem of not having enough financial resources or capital to further intensify or diversify.

As mentioned by the fishermen during qualitative data collection that even if they had the skills or knowledge to generate more income, they were not able to do so as they did not have enough capital in place to do so. This caused them to depend heavily on subsidies and other forms of government support, which are made available for the fishermen community. According the respondents, subsidies granted include *sampan Azam Tani*, investment loan, *Bantuan Rakyat 1 Malaysia (BRIM)*, *mykasih* and housing upgrading package. Among all these strategies, 89% received BRIM, 41% received investment loan, 29% of the respondents received *sampan Azam Tani*, 25% received *mykasih*, 14% received housing upgrading support and lastly 7% received investment loan, with none of the respondents not receiving at least one form of support from the authorities. With enough support and strong source of other coping strategies, together with the attitude of “scratch in the morning, eat in the morning”, it allowed the fishermen to continue in intensifying their livelihood strategies as the coping strategies made it possible for them to merely survive in the industry. However, long term support might not be a good idea in the process of achieving sustainable livelihood.

In conclusion, coping strategies is indeed necessary for coastal fishermen and that intensification might not be an effective way to maintain a stable source of income which can assist the fishermen in going through shock or decline in income.

6.3.5 Effect of risk associated with fishing activities and choice of livelihood strategies made

Hypothesis 4a: There is a significant relationship between risk associated with fishing activities and livelihood intensification.

Hypothesis 4b: There is a significant relationship between risk associated with fishing activities and livelihood diversification.

Research on coastal fishermen of Pangkor Island showed that there was a significant relationship between risk associated with fishing activities and livelihood intensification, while no significant relationship was found between risk associated with fishing activities and livelihood diversification. Out of the four types of risks which had passed through the data screening process, 91% of the respondents agreed that poor weather which doesn't allow them to go to the sea is the main risk carried by them as coastal fishermen, 82% agreed that not having enough fund to repair fishing gear and boat is crucial, 73% agreed that they have been facing risk of lost fishing gear while 70% agreed that poor weather which causes accident in the middle of the sea is affecting them.

This result is in line with many past researches regardless of differences in fishermen background and location. A research done in Norway on how Norwegian coastal fishermen dealt with occupational risk showed that even though fishing activities involved high number of fatalities and personal injuries that came with working at sea, coastal fishermen seemed to display risk-loving tendencies towards fishing activities (Thorvaldsen, 2013). Similar results were shown in the studies of coastal fishermen in

Maine, USA (Davis, 2012). According to Thorvaldsen (2013), Norwegian coastal fishermen had taken the risk itself as part of their daily routine, and therefore, they had adopted various ways of dealing with the risk, while continuing to intensify in fishing. A few common risk management approaches employed by the fishermen were common sense, experience, taking precautions, risk evaluation, cooperation and communications.

A similar trend is seen in the coastal fishermen of Pangkor Island through qualitative research, whereby the fishermen mentioned that despite knowing the risk they were carrying on daily basis, which included risk of zero catch, accident, poor weather, health issues, etc, they insisted on going to the sea if their common sense or experience allowed. This trend of behaviour can be better understood when the fishermen called themselves “*anak nelayan*”, which literary means “the children of fishing”.

This risk-loving tendency or the spirit of “*anak nelayan*”, had caused the fishermen to be less sensitive towards risk. According to Shaffril, D'Silva, Kamaruddin, Omar, & Bolong (2015), research on coastal community awareness towards the climate change in Malaysia showed that coastal fishermen in Malaysia seemed to be less sensitive towards the adverse effects of climate change as compared to other coastal communities. This scenario was described by Hassan et al. (2011) as “immune”, whereby they argued that fishermen’s long-term involvement in sea related activities had caused them to be immune towards risk they were exposed to. As a result, fishermen tend to find strategies to survive as a fisherman instead of trying other possible risk-neutral strategies as source of income, i.e. livelihood diversification. These past findings are therefore similar to the result found on Pangkor Island.

6.4 Research Objective 2: To investigate the relationship between livelihood strategies and sustainable income of coastal fishermen on Pangkor Island

Hypothesis 5a: There is a significant relationship between livelihood intensification and sustainable income

Hypothesis 5b: There is a significant relationship between livelihood diversification and sustainable income

This research showed that there was a direct relationship between livelihood intensification and sustainable income (Hypothesis 5a accepted) and no significant relationship between livelihood diversification and sustainable income (Hypothesis 5b not accepted). In other words, fishermen who had intensified fishing activities had higher expectation on sustainable income, as compared to those who had diversified, or they agreed that there was still a gap between their current income and what it takes to achieve sustainable income.

Many past researches have inconsistent results. For example, according to research done by Marine Resource Assessment Group, fisheries activities are vulnerable to over-exploitation of natural resources, which will ultimately cause income unsustainability when resources are exploited. Another research done in Indonesia showed that activities such as seaweed farming, which had been put in action by fishermen in the said country, played an important role in improving socio economic condition of fishermen, i.e. to achieve a more sustainable income (Zamron & Yamao, 2011). Carra, Peri, Monaco and Vindigni (2014) also mentioned that diversification will assist fishermen in reducing the risk of livelihood failure, decrease vulnerability, and increase the number of income source which could help fishermen in achieving their aim of sustainable income.

Therefore, there is supposed to be a significant negative relationship between livelihood diversification and sustainable income as well. But in this case, this relationship was shown to be insignificant. This could be mainly due to the fact that most of the fishermen did not have a permanent income generated from diversified sources. This could result in inconsistent income generated from diversified sources, which caused various views generated from fishermen towards the possibility of livelihood diversification in closing the gap between current income generated and their aim of sustainable income.

These results are in line with the next two results, i.e. relationship between livelihood strategies and willingness to learn as well as willingness to venture. Fishermen who had tried livelihood intensification felt that they needed more sustainable income of which fishery might not be able to fulfil, therefore, they were willing to try something else if opportunities were given.

6.5 Research Objective 3: To analyse the role of willingness to change in determining the choice of livelihood strategies

6.5.1 Willingness to learn and choice of livelihood strategies

Hypothesis 6a: There is a significant relationship between fishermen willingness to learn and livelihood intensification

Hypothesis 6b: There is a significant relationship between fishermen willingness to learn and livelihood diversification

This research revealed that coastal fishermen's willingness to learn will lead fishermen to choose diversified livelihood strategies, and less of livelihood intensification. In other words, Hypothesis 6a was not accepted while Hypothesis 6b was accepted. This reflected the fact that fishermen who were willing to take up courses, attend industrial training or spend time gaining knowledge were fishermen who would most likely chose to adopt livelihood diversification strategies. These relationships were found even though some of the courses or workshops which the fishermen had attended were fishing related, such as fibre glass boat making, engine repairing course, fish farming and solar seafood process. Refer to Figure 6.1 for fiberglass *sampan* made by fishermen during two weeks' workshop. These boats are more durable than the normal wooden boat, and it's a profit-making business if the fishermen who mastered it manage to build and sell.



Figure 6. 1: Fiberglass *sampan*

This result is similar to results obtained by Demissie and Legesse (2013) on farmers in Fedis district of Ethiopia, which showed that farmers who were educated were found to be pulled towards more profitable non-farming activities instead of venturing more

towards farming activities. Janvry and Sadoulet (2001) in their research on farmers in Mexico further confirmed this result by revealing the fact that household heads who were willing to learn or willing to gain knowledge, were more likely willing to participate in non-farming self and wage employment activities.

According to Gordon and Craig (2001), one who was willing to learn would have better access to non-farming employment offer, had better opportunity of starting their own business.

6.5.2 Willingness to venture and choice of livelihood strategies

Hypothesis 7a: There is no significant relationship between fishermen willingness to venture and livelihood intensification

Hypothesis 7b: There is a significant relationship between fishermen willingness to venture and livelihood diversification.

This research showed no significant relationship between fishermen's attitude towards venturing into other source of income and their choice of applying livelihood diversification and livelihood intensification. Some fishermen who are willing to venture chose to diversify and intensify, while some who are willing to venture chose not to intensify.

As the qualitative findings shows, some fishermen have tried various source of income, such as crafting, part time employment at the hotel or restaurant, or even multiplying fishing methods, but chose to give up in the end as it was not inline with their working style, can't achieve desired level of job satisfaction, age catching up, increased family commitment, etc. On the other hand, there are fishermen who are willing to

ventured, and still continue what they have started to explore, for example, work as part time security guard.

6.6 Research Objective 4: To provide recommendation regarding policy making to improve livelihood of coastal fishermen of Pangkor Island

The purpose of this research is to construct a simple framework for the use of the readers, particularly policy makers in their future fiscal policies and development plan concerning the coastal fishermen of Pangkor Island.

According to Dixon, Gulliver, & Gibbon (2001) the right choice of livelihood strategies could improve livelihood of the household and the community as a whole. Dixon et al. (2001) suggested four ways of achieving this, (1) livelihood intensification through increased use of input of better quality of output, (2) livelihood diversification through greater market orientation and value-addedness, (3) increase farming or fishing areas if additional natural resources is available, and (4) exit from agriculture or fishing industry, i.e. migration.

a. Proper management of workshops

In the case of coastal fishermen of Pangkor Island, as mentioned in the earlier sections, the level of education did affect fishermen's choice of improving their income through change of livelihood strategies, i.e. to intensify or diversify. The results also showed a direct relationship between willingness to learn and livelihood diversification. Therefore, it is clear that the higher the level of education, level of knowledge and skills available, the more choices the fishermen will have to intensify or diversify.

Currently, many workshops have been carried out by LKIM or the state government from time to time, but there were some loopholes in the implementations process. As the fishermen response showed, 31% of respondents had attended engine repairing course and 9% of respondents had attended fibre glass boat making workshop.

However, only 20% of them agreed that it had helped them in solving their daily problems and only 16% of them agreed that courses attended had benefited them through the increase in level of income. To make it worse, 37% of them agreed that courses attended were not beneficial as they did not have enough financial capital (i.e. high rental cost of shops, high cost of equipment and other materials), there was no physical capital available (i.e. shops lots) or courses attended was too brief to be applied as resources to generate further income. Therefore, besides carrying out workshops, continuous follow-up is needed so as to increase the usefulness level of investment put into workshops. This can be done through financial assistance, such as simple loan application process, loan application guidelines, grants, tax breaks or lower rental cost through renting government invested properties.

On top of that, 33% of the fishermen had not attended any courses because they were not aware of it and 27% did not attend because they were not 'selected'. This showed that proper dissemination of information is much needed so that valuable effort put in by LKIM and the state government will benefit every coastal fishermen of the island.

Hence, authority, particularly DOF and LKIM may look into the possibility of investing a mobile application which provide a platform for sharing of information with regards to the workshops available. This will not only solve the problem occurs in the dissemination of information, it may allow fishermen to register to any workshop available too.

Besides, at the moment, fishermen who attend any workshop are given allowances, to encourage higher rate of participation. This allowance should be demolished as it may result in resources distortion. Fishermen may attend workshop because of the attractive workshop allowance offered, with that, it will be difficult for the workshop organizer such as DOF and LKIM to determine the most suitable workshops to be offered for the fishermen. Removing workshop allowance will attract fishermen who are truly interested to learn, which will ultimately increase the success rate and usefulness of workshops. This recommendation is supported by Jack (2009), who called this kind of allowance as a type of per diem, i.e. “a form of institutionalized, legal time-wasting that is endemic and an unwelcome global phenomenon legitimized by donors and international organizations alike”. Besides, it will also attract people who does not need to be trained to attend, result in sending the wrong people for training, slowing down work efficiency level (as they choose to attend training, instead of performing normal duty, of which in this case, going to the sea) (Vian, 2009).

Next, the workshop organizer, speaker or trainer have to be flexible or being creative in choosing the right training date and time. Workshops should be carried out during low season preferably. This will allow the fishermen to earn their living during good season. To achieve this, the organizer must be familiar with the fishing season, and the trainer or speaker should preferably be someone from the same community, in other words, from the fishermen community itself. For example, trainer may be the successful fishermen such as Pak Su, the Chairman of FA, deep sea fishermen who were once traditional fishermen, seafood processor on the island, boat manufacturer, etc. As for non-fishing related workshops, the organizer may approach other operators on the island such as the hotel operator, tour operator, or even teachers in school. Having someone from the island itself as trainer will not only allow flexibility of time, but will increase the benefit of each workshop, as they know each other and speaks the same language.

Lastly, workshops organized should be targeting at improving human capital of the fishermen community, and at the same time, minimize financial burden. Workshops which teaches skills that need high level of financial capital to be in place to put what they have learnt in practice might not be practical. Fishermen may not benefit from it, or may be in heavy debt if they decide to take up loan to make use of what they have learnt. These two scenarios are currently seen happening among the coastal fishermen. Besides, workshops should not encourage fishermen to stop fishing, or to exploit natural resources as well. Workshops should focus on intensification but not exploiting the natural resources, or diversification during low season or off fishing hours. Therefore, choosing the right workshops to be introduced is deemed to be crucial.

b. Proper management of subsidies

Government support through transfer payments, such as subsidies is important in rural areas. These supports may include regulating capitalization in fisheries or by providing flexible loan (Allison & Ellis, 2001).

Many types of subsidies are made available to coastal fishermen, which includes diesel, *sampan* with engine, monthly allowance, cost of living allowance (COLA – formally known as BR1M), *my-kasih*, etc. Subsidies are meant to reduce the cost of fishing, reduce living expenses and to provide fishermen with sustainable income.

However, 53% of the fishermen agreed that only a small number of fishermen were selected to receive subsidies (besides monthly allowance and COLA), and 45% agreed that the fishermen selection (to receive subsidies) process were biased. In the open-ended interview session, fishermen mentioned that some fishermen who had not been active in fishing activities received subsidized *sampan* and engine twice, after the first one was sold, and the second one was rented out.

In terms of fishermen monthly allowance, the researcher recommends that no fishing allowance for fishermen who had not achieve 120 days of fishing days should be implemented strictly.

Therefore, once again, subsidies might not be useful if it is not being distributed through proper channels. Subsidies protocol is therefore urgently needed to be in place that only fishermen who deserve will receive, or subsidies provided will turn out to be deadweight loss for the economy.

One suggestion to improve the distribution of subsidies is that all subsidies should be distributed through one agency only, which in this case, the best one would be LKIM. LKIM should be provided with a real time system for all subsidies to be recorded and updated information to be retrieved. This will allow LKIM to monitor the movement of all these allocations given. LKIM should be audited by an independent or committee from time to time, to avoid any misused of power if dissemination of all subsidies were to be centralized. Proper management of subsidies can also help to reduce chances of overfishing.

Besides, LKIM should enforce the 120 days fishing activities rules, so that only fishermen who deserve the monthly allowance will be given. This should, ultimately encourage all fishermen to register their fishing activities, which makes it easier for LKIM to manage the availability and price of fishes in the market, and at the same time, avoiding overexploitation. According to OECD, subsidy itself is neither good nor bad, as it can help to overcome temporary crisis, acquire new skills, exploring new fishing methods, etc (Love, 2010). However, when it is not well managed, it can be redundant, or worse still, result in unsustainable use of natural resources (Love, 2010).

LKIM may want to follow up on fishermen claimed on fishing boat being rented out or sold out and take legal action whenever possible. This is crucial as the subsidized

fishing boats are meant to be used by fishermen to improve their livelihood, and not to be exploited by other profit seeking individual. Besides, investigation must be done to find out the reason for fishermen not receiving fishing allowances as well, and the investigation result should be communicated too. This is important as it is tarnishing the FA, LKIM and DOF's image.

c. Financial Management Package

As shown in the previous section, there is a direct relationship between coping strategy and livelihood intensification. In other words, as long as the fishermen can find ways to manage expenses, to dig from savings available and to seek for external help, they will continue to be fishermen. As fishing output is important for the country GDP, it makes it important for fishermen to intensify fishing activities.

Besides proper management of subsidies and assistance in loan application to assist livelihood intensification and diversification, an exposure on financial management system should be in place as well. Majority of the respondents agreed that their savings would only last them less than a month due to inconsistency in income generated, which resulted in them choosing to cut down their daily expenses to a stage of cutting down the number of meals per day or to seek for loan. This is worrying as it will not only limit the coastal fishermen's ability to achieve sustainable income, it will also result in further health issues or they will be heavily in debt.

The researcher therefore suggests that LKIM withhold a certain portion of fishermen's monthly allowance and put it into the fishermen retirement fund, with government topping up the same amount of money into the said retirement fund. This is

to encourage savings habit and to secure minimum source of income when the fishermen retires. This suggestion is also mentioned by Karuppusamy and Karthikeyan (2018) in their study on fishermen in Puducherry, India.

On top of that, continuous financial management workshop should be made compulsory for fishermen to attend. This is crucial for fishermen so that they will not cut down expenses on basic necessities such as food and education, and still maintain expenses on cigarettes.

All these moves are crucial as literature review shows that fishermen will generally refuse to leave the fishing industry, even though they realize that the fishing output is declining, so as to income generated from fishing industry (McGoodwin, 1990). This is mainly due to the job satisfaction achieved through fishing activities (Pollnac & Poggie, 2008), in this case, when they are proud to be identified as "*anak nelayan*".

d. Introduction to efficient way of generating income

As discussed, fishermen who are willing to learn new things tends to diversify. This shows that they are willing to generate income from other sources besides fishing if opportunity is given.

Therefore, the researcher suggests that the authorities provide funding for the operators of other industries to carry out on-the-job training, or consider providing part time job opportunities as part of corporate social responsibility activities for the operators. These two actions will encourage operators of other industries to take in fishermen, i.e. provide opportunities for diversification and subsequently achieve sustainable income.

Besides, some fishermen stick to only one way of fishing with the reason that they had interest in only that fishing method, even if it meant minimal income generated.

Therefore, LKIM may introduce reward packages for those who are willing to try new fishing methods or to start aquaculture. This step is important as it allows the fishermen to experience for themselves the fruits of intensification or aquaculture. With this, they should be motivated to further intensify and to achieve sustainable income. To further encourage aquaculture, the authority might look into a hire-purchase program to reduce start-up capital needed, and have the professional advice, hence to minimize risk of failure. The authority might invest in starting of aquaculture, having fishermen to pay monthly instalment as they start harvesting, and transfer the ownership in the end.

Lastly, the FA may play a more significant role in assisting the coastal fishermen to improve their income level and economic status. FA of Pangkor Island is one of those area FA which does not involve actively fishing activities, not even marketing of fishing output (Othman, 2004). Fishermen on Pangkor island register their fishing output with LKIM, and then market the output on their own. It would be great if FA can be a mediator, assisting the fishermen to market their catches for a better price. This will provide wider range of market for the fishing output and subsequently improve the income level of fishermen. Once again, to realize this role on Pangkor Island, an audit team is needed to avoid misuse of power.

However, it is important to once again note that the coastal fishermen are a group of community who are risk taker, "*kais pagi makan pagi*", and is proud of their identity as "anak nelayan". Many fishermen have tried taking up full time job on Pangkor Island for a more sustainable income, but it failed badly as they are not used to the different lifestyle and working culture (refer to qualitative findings). Therefore, diversification opportunity to be offered or plan to be implemented should be one that can accommodate the characteristics mentioned (Sievaren et al, 2005; Cinner, Daw & McClanahan, 2009). For example, job opportunity mentioned above should be of part time based or provide weekly if not daily pay, as this will provide daily household need, allow fishermen to

have the flexibility to go to the sea when the weather allows, and the working and income pattern is similar to one they have been practicing.

e. Introduction of technologies to reduce risk

Technology development in fisheries is important to reduce risk, to increase efficiency in fish processing and storage, as well as improving vessel safety and seaworthiness (Allison & Ellis, 2001).

As this research has shown, coastal fishermen of Pangkor island are willing to continue to be fishermen despite realizing the risk they were carrying on a daily basis for taking fishing as their occupation. This may not be easily articulated by non-fishermen, i.e. why not diversify when its risky? Literature review shows that fishermen are those who are active, adventurous, aggressive and courageous (Pollnac & Poggie, 2008), which supports them to continue with this profession even though it is risky. On top of that, for the benefit of the country's economic growth and sustainable food supply, it is indeed important for the fishermen to apply livelihood intensification strategy. This makes the effort of reducing risk associated to fishing more crucial.

The authority may do so by making it compulsory for GPS to be installed onto every *sampan* or boat operated by coastal fishermen. This will allow the Maritime and LKIM to easily allocate the fishermen location at all times, and to save them in case of emergency. The same system also allows Maritime improve management and to monitor fishermen compliance with fishery policies, i.e. not carrying out fishing activities in illegal fishing area.

Besides, weather forecast should be made available to all fishermen, through audio system placed in LKIM office, official mobile application. This gives fishermen more accurate information to assist them in decision making, i.e. to go to the sea or not,

besides depending on their own experience or information shared by their fishermen counterparts. This method was discussed and agreed by three speakers, Daniel Schrag, the Professor of Geology at Harvard, Jeffrey Sachs, the Director of Earth Institute at Columbia University and Somkiat Tangkivanich, the President of the Thailand Development Research Institute through the Jeffrey Cheah Institute on Southeast Asia Conference, that new technologies will indeed address problems created by climate change.

Next, fiberglass boat in replacing the traditional wooden base boat has been an ongoing trend in many countries. It is becoming more popular due to its light weight and its durability, hence, reduces the risk of fishing. Some fishermen on Pangkor Island have attended the workshop of building fiberglass boat and has mastered the skill. Therefore, it would be good if the next time the authority plan to provide fishing boat to the fishermen community, to purchase from these fishermen a fiberglass boat. By doing this, it will not only reduce the risk of fishing of the recipients, but also create income for the builder.

f. Exposure on sustainable income

Lastly, this research showed that fishermen who had applied livelihood intensification strategies agreed that they had achieved sustainable income, while those who had applied livelihood diversification strategy disagreed. This may not be contributed by the lack of diversification opportunities, as Chapter 1 presented the effort put in by the authorities in developing the tourism industry on Pangkor Island. However, as mentioned, this could be contributed by the lack of knowledge on the meaning of sustainable income or sustainable livelihood as a whole.

According to the DFID Sustainable Livelihood concept, there should not be a standardized or benchmark on what sustainable livelihood is, which includes sustainable

income. However, the researcher believes that an appropriate understanding of sustainable income is crucial for the coastal fishermen to even decide if they have achieved sustainable income, instead of believing in “*kais pagi makan pagi, kais petang makan petang*”, i.e. scratch in the morning, eat in the morning; scratch in the evening, eat in the evening.

Therefore, the researcher recommends that such exposure be spoken out and discussed through motivational talks or campaigns. The fishermen are expected to realize that sustainable income is not just about having enough income to cover daily income, but to have achieve an improvement in the quality of life as well.

Besides, according to Yahaya and Abdullah (1993), fisheries is significant to the Malaysian economy as it contributes to the source of food and protein, contributes to GDP, provide source of employment and generate foreign exchange earnings. However, it is known that natural resources of fishery products in the world are moving very closely to saturation level, especially in the coastal area. Feasibility studies of this research also showed that aquaculture is not a good choice due to water saltiness level around Pangkor Island. Hence, the researcher would like to suggest the introduction of artificial reefs project in this place just like how it has been used to improve the livelihood of coastal fishermen in Terengganu and other places across Malaysia. However, artificial reefs project comes with a huge amount of cost, hence, if this suggestion is accepted, it might have to be introduced in the upcoming fiscal planning, so as to allocated appropriate amount of budget for this project.

6.7 Summary

This chapter mainly discuss each finding presented in Chapter 4 and Chapter 5. It ties up research findings and the research objectives 1 to research objectives 3. This shows

that three research objectives were achieved through two phases of data collection. The final research objective was achieved by providing recommendation on a more effective strategy of policy implementation. Recommendations were presented based on the accepted hypotheses.

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CHAPTER 7 CONCLUSION, LIMITATION, RECOMMENDATION FOR FUTURE RESEARCH

7.1 Conclusions

Several conclusions can be drawn from this research to fulfil the four research objectives mentioned in Chapter 1. The following conclusions are based on the results of hypotheses testing in Chapter 5.

Objective 1: To obtain basic understanding of Pangkor Island coastal fishermen with regards to their livelihood strategies

Based on the test results of Hypotheses 1 to 4, it is concluded that the level of education, level of income versus expenses, trend of output, risk associated to fishing activities and coping strategies available will affect the coastal fishermen's choice of livelihood intensification strategies. Factors which had a stronger positive correlation ($r=.290$, $p<.05$) with the choice of livelihood intensification strategies is level of income versus expenses, while risk associated to fishing activities had a weaker positive correlation livelihood intensification strategy based on SEM.

On the other hand, the level of education, level of income versus expenses, trend of output and willingness to learn affects their choice of livelihood diversification strategies. Factors which had a stronger positive correlation ($r=.521$, $p<.05$) with choice of diversification strategies is trend of output while level of education had a weaker positive relationship with the choice of diversification strategies based on SEM.

In other words, to encourage livelihood intensification, efforts need to be placed on improving their level of income such as proper management of fishermen allowances, subsidies, proper financial management, and introduction of technology to increase level

of income generated from fishing activities. In order to encourage livelihood intensification, focus should be placed on increasing the level of fishing output, instead of providing more subsidies, as it will stimulate the fishermen's intention in gaining more income. When the fishermen realize the limitation of generating output from fishing activities, they might be encouraged to venture into aquaculture activities or seafood processing activities.

In short, it was identified that there were more factors facilitating choices of intensification as opposed to diversification. This can be related to lesser diversification activities carried out, hence inconsistent response is given.

Objective 2: To investigate the relationship between livelihood strategies and sustainable income of coastal fishermen on Pangkor Island.

The results of Hypotheses 5a and 5b showed a significant relationship between the fishermen's view of sustainable income and their choice to intensify, while no significant relationship was found between the same to the choice of livelihood diversification. However, as mentioned, this unusual result could be due to coastal fishermen being satisfied with only having enough financial capital to cover their daily expenses, even if it meant nothing extra for the following day. Therefore, to improve the fishermen livelihood, compulsory savings for retirement might encourage long term planning among the fishermen

Objective 3: To analyse the role of willingness to change in determining the choice of livelihood strategies.

Test results of Hypotheses 6 to 7 showed a significant positive relationship between willingness to learn and choice of livelihood diversification while no significant relationships were found between willingness to learn and livelihood intensification, and willingness to venture and any choice of livelihood strategies.

Therefore, the researcher suggests proper management of workshops to encourage livelihood diversification. On top of that, providing opportunities in other industries which allowed fishermen to be trained and to generate side income is crucial as it will encourage fishermen to venture into other industries.

Objective 4: To provide recommendation regarding policy implementation to improve livelihood of coastal fishermen of Pangkor Island.

In this research, six recommendations were introduced based on the factors affecting fishermen's choice of livelihood strategies. The recommendations include (1) proper management of workshops including transparent process of choosing participants and follow up program after each workshop, (2) proper management of subsidies which comes with detailed protocol of selecting recipients, (3) financial management package which includes compulsory contributions to retirement fund and workshops on financial management, (4) introduction to efficient way of generating income including reward scheme to encourage the use of multiple fishing methods and subsidies for companies which provides training and part time job opportunities to fishermen, (5) Exposure on sustainable income which includes educating through campaigning or training on what sustainable income is all about.

Besides, the researcher would like to recommend a total change in the distribution of subsidies for the coastal community.

To conclude, this research has addressed all problem statements raised in Chapter 1. These include encouraging diversification or portfolio livelihood strategies due to extinction of fishing resources, by understanding the factors determining the choice of livelihood strategies. Secondly, identify how the view of sustainable income affects the choice of livelihood strategies. Thirdly, to introduce customized livelihood framework which represent coastal fishermen of Pangkor Island, i.e. Livelihood Strategies Framework. Fourthly, to determine how willingness to change might affect the choice of livelihood strategies despite having other resources in place, and lastly, to suggest appropriate ways of implementing existing development plan through the understanding of the factors determining the choice of livelihood strategies.

7.2 Limitation

The first limitation of this study was the limited data collected due to time constraint. Sample size has achieved the guided size provided by Morgan Krejcie and Morgan Table. However, a larger sample size can further improve the validity of Livelihood Strategies Framework.

Furthermore, just as with any other livelihood framework, the Livelihood Strategies Framework generated can only be used to represent coastal fishermen of Pangkor Island. Further research will be needed to examine its suitability to represent other groups of communities.

Lastly, data collected was based on the fishermen's limited understanding of language, even though the researcher had used Bahasa Malaysia, i.e. a language mostly

used by the coastal fishermen. However, due to their limited level of education achieved, some questions might be too difficult for the fishermen to answer. The researcher had tried to address this issue by reading out loud questions which fishermen left blank when the researcher collected the questionnaires from the respondents. For the questions which the fishermen had answered, the researcher did not further read out or explained the question. This was done to maintain the consistency level of the data collection process, and reliability test comparing result of the two groups showed alpha value of more than 0.70, but it might have created a blind spot.

7.3 Recommendation for future research

The final section of this thesis focused on suggestions for future research. This comprehensive study explored factors determining choice of livelihood strategies among coastal fishermen of Pangkor Island. However, there is still room available for further investigations.

One of the areas that was considered to be worthy of investigation is collect data using the same research tool and LSDF from the same community in the future. By doing this, the validity level of LSDF can be further improved. Besides, the similar research can be done on other fishermen communities, or communities of other profession to increase the possibility of generalizing LSDF.

Secondly, focus group and field observation may be used to test LSDF. These two methods might overcome language and education barriers. Besides, through this study, the researcher observed that fishermen community feel more comfortable to share information when they are in a group. Hence, focus group and field observation might allow future researcher to explore greater deal of information before reaching saturation level.

Lastly, future research targeting at other operators on the island could be helpful in mining solid data with regards to opportunity available and expectation of the operators on fishermen. By understanding what other operators are expecting from the fishermen before they are being adopted into the respective industries, the relevant authorities would be able to better prepare the fishermen community in taking up the opportunities and hence, improving the fishermen livelihood.

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