Beyond the cocoa farm: A new look at farmers’ livelihoods in Papua New Guinea.

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Doctor of Philosophy
2017

A thesis submitted to Charles Sturt University for the degree of Doctor of Philosophy
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<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ACIAR</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>AR4D</td>
<td>Agriculture Research for Development</td>
</tr>
<tr>
<td>ARD&amp;E</td>
<td>Agricultural Research Development and Extension</td>
</tr>
<tr>
<td>ARDSF</td>
<td>Agricultural Research &amp; Development Support Facility</td>
</tr>
<tr>
<td>ASLA</td>
<td>Agriculture based Sustainable Livelihood Approach</td>
</tr>
<tr>
<td>CBO</td>
<td>Community-based Organisation</td>
</tr>
<tr>
<td>CCI</td>
<td>Cocoa Coconut Institute Limited</td>
</tr>
<tr>
<td>CPB</td>
<td>Cocoa Pod Borer</td>
</tr>
<tr>
<td>DAL</td>
<td>Department of Agriculture and Livestock</td>
</tr>
<tr>
<td>DASF</td>
<td>Department of Agriculture Stock and Fisheries</td>
</tr>
<tr>
<td>DDAL</td>
<td>District Department of Agriculture and Livestock</td>
</tr>
<tr>
<td>DFID</td>
<td>Department for International Development (UK)</td>
</tr>
<tr>
<td>DOI</td>
<td>Diffusion of Innovation</td>
</tr>
<tr>
<td>ENBP</td>
<td>East New Britain Province</td>
</tr>
<tr>
<td>ENBPG</td>
<td>East New Britain Provincial Government</td>
</tr>
<tr>
<td>FFS</td>
<td>Farmer Field School</td>
</tr>
<tr>
<td>HLPE</td>
<td>High Level Panel of Experts (on food security and nutrition)</td>
</tr>
<tr>
<td>IFAD</td>
<td>International Fund for Agricultural Development</td>
</tr>
<tr>
<td>IMM</td>
<td>Integrated Marine Management Ltd</td>
</tr>
<tr>
<td>KIK</td>
<td>Kokonas Industri Koporesen</td>
</tr>
<tr>
<td>KVRTC</td>
<td>Kairak Vudal Resource Training Centre</td>
</tr>
<tr>
<td>LLG</td>
<td>Local Level Government</td>
</tr>
<tr>
<td>MP</td>
<td>Morobe Province</td>
</tr>
<tr>
<td>NADP</td>
<td>National Agricultural Development Plan</td>
</tr>
<tr>
<td>NARI</td>
<td>National Agricultural Research Institute</td>
</tr>
<tr>
<td>NARS</td>
<td>National Agricultural Research Systems</td>
</tr>
<tr>
<td>NDAL</td>
<td>National Department of Agriculture and Livestock</td>
</tr>
<tr>
<td>NGO</td>
<td>Non Government Organisations</td>
</tr>
<tr>
<td>OLPG</td>
<td>Organic Law on Provincial Governments</td>
</tr>
<tr>
<td>PDAL</td>
<td>Provincial Department of Agriculture and Livestock</td>
</tr>
<tr>
<td>PNG</td>
<td>Papua New Guinea</td>
</tr>
<tr>
<td>PNGCB</td>
<td>Papua New Guinea Cocoa Board</td>
</tr>
<tr>
<td>PNGNARS</td>
<td>Papua New Guinea National Agricultural Research Systems</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>RD&amp;E</td>
<td>Research Development &amp; Extension</td>
</tr>
<tr>
<td>SLA</td>
<td>Sustainable Livelihood Approach</td>
</tr>
<tr>
<td>SLED</td>
<td>Sustainable Livelihood Enhancement and Diversification</td>
</tr>
<tr>
<td>SLF</td>
<td>Sustainable Livelihood Framework</td>
</tr>
<tr>
<td>SPISARD</td>
<td>South Pacific Institute for Sustainable Agriculture and Rural Development</td>
</tr>
<tr>
<td>UNITECH</td>
<td>The Papua New Guinea University of Technology</td>
</tr>
<tr>
<td>UNRE</td>
<td>University of Natural Resources and Environment</td>
</tr>
<tr>
<td>WNBP</td>
<td>West New Britain Province</td>
</tr>
</tbody>
</table>
CERTIFICATE OF AUTHORSHIP

“I William Kerua

Hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at Charles Sturt University or any other educational institution, except where due acknowledgment is made in the thesis. Any contribution made to the research by colleagues with whom I have worked at Charles Sturt University or elsewhere during my candidature is fully acknowledged.

I agree that this thesis be accessible for the purpose of study and research in accordance with the normal conditions established by the Executive Director, Library Services or nominee, for the care, loan and reproduction of theses.”

Name: William Kerua

Signature:  
Date: 23/03/2017
ACKNOWLEDGEMENTS

I have come a long way in my life. Starting my career as a Fisheries Technician in the mid 1980’s I never dreamt of coming this far to complete a PhD. Life unfolded and led me to further my education from a certificate holder to diploma, advanced diploma, degree, masters, and now the completion of my PhD. Thank you Mighty God!

“For I know the plans I have for you,” declares the LORD, “plans to prosper you and not to harm you, plans to give you hope and a future (Jeremiah 29:11)

Throughout my journey there were numerous people who helped me in all aspects of my life, to shape me to come this far, but I am unable to acknowledge them all. In the context of this thesis, it has been a unique opportunity, and its completion would have been improbable without the help from a large number of people.

Firstly and foremost, I must thank my supervisors, Dr Scott Glyde, Emeritus Professor Ted Wolfe and Dr Alison Southwell. In particular, it has been an honour to work alongside Scott as a principal supervisor, mentor, and a friend. The flexible style of his supervision in allowing me to complete this thesis, and his intellectual guidance is gratefully acknowledged.

I wish to thank the Australian Centre for International Agricultural Research for providing the scholarship support for my study at Charles Sturt University. I also wish to thank the Head and the staff of the School of Agricultural and Wine Sciences and the EH Graham Centre for providing office space, a computer, and other necessities for completion of this thesis. Christopher Roche liaised with my sponsor and the University on scholarship matters, Lesley Walker of the Accounts Section addressed my financial matters during my studies, and Skye Sharp and Lyndal Johns of the Travel Office organised and facilitated my travel to PNG for fieldwork. I also extend my thanks to The Papua New Guinea University of Technology (Unitech) for releasing me to do my PhD studies and for providing administrative support. I would particularly like to thank Professor Abdul Halim for his encouragement and for the updates on academic activities at Unitech.

I also wish to thank Kuraip Emil and family of Vudal village, and Maryanne Timan and family of Burit village in East New Britain Province for their hospitality during the fieldwork in 2004. In the Morobe Province, I am in debt to Gibson Kasi, who provided my accommodation in Erap and introduced me to the farmers of Wampup and Gabsongkeg villages during my fieldwork there.
I further wish to thank Anna Wai for helping with transcribing the recorded interviews from ‘Pidgin’ to English. It was laborious work, but she managed to finalise the scripts. I also wish to thank Craig Poynter of the SPAN Office for his assistance in drafting the study site maps for my thesis, and Lynne Appleby for committing so much time to proof reading these chapters and offering such constructive comment on both grammar and structure.

Finally, I wish to thank my family especially my late wife Angeline Waiu Kerua and the Jika Operombs for their prayers, faith and support, and for putting up with my absence as a father, head of the household, and the clan.

Glory be to God!
ABSTRACT

Cocoa is the third most important cash crop of Papua New Guinea (PNG) and about one million people depend on cocoa as their main source of income. The PNG Government has invested in cocoa research, development and extension (RD&E) to improve production, but cocoa productivity remains lower than what is potentially achievable. While RD&E emphasis is on technical aspects to improve productivity, there has been little research into understanding why the cocoa farmers are doing what they are doing. This study investigates the farmer’s environment, their way of life, and their determination to produce cocoa. It also aims to explore the farmer’s livelihood and its diversification in order to understand the scope of cocoa production, and its relative priority compared to other priorities, from the farmer’s perspective.

With the Agricultural based Sustainable Livelihood Framework (ASLF) as a guide, semi-structured interviews, discussions, and observations were used to study the livelihood of cocoa farmers in Morobe and East New Britain Province of PNG. Twenty one farmers and ten extension officers were interviewed with the aim of reaching a saturation point. All data were processed and analysed using NVivo software.

The study indicated that land tenure and shortage, culture, traditions, livelihood diversification, and low government support were the key factors with influence on cocoa production. Whilst the RD&E system focuses on increasing production for profitable capital-based farming, farmers are entrenched within their socio-cultural practices and consider farming more as a way of life to survive. Farmers seem adverse to risk, and seek to make a reasonable income from diverse livelihood activities rather than focusing solely on more profitable cocoa production. There is a clear imbalance between farmers and their approach to farming, and the RD&E perspectives and priorities concerning cocoa production. The study developed a refined conceptual framework for livelihood studies, the ASLF, that can ideally be used by extension practitioners in future applications and interventions while concluding that a descriptive analysis of this study could later be tested empirically using a quantitative approach.
CHAPTER ONE GENERAL INTRODUCTION

This chapter will provide a brief overview of the agriculture industry in Papua New Guinea (PNG), the relative importance of cocoa within the industry, and the broader factors affecting cocoa production before narrowing down to the research problem and the objectives of the study.

1.1 BACKGROUND

PNG’s natural assets are characterised by significant reserves of oil, gas, gold, copper, timber, agriculture and marine resources. Agriculture provides a means of living for more than 85 percent of the country’s population, while accounting for over 27 percent of PNG’s gross domestic product (GDP) (Papua New Guinea Cocoa and Coconut Institute, 2010). In 2012, PNG’s agricultural exports were worth 2.7 billion Kina (US$1.2billion) (Bank of Papua New Guinea, 2013). With the exception of palm oil, the production of most cash crops for export has been stagnant over the last 5 years (Bank of Papua New Guinea, 2012b).

A number of factors are responsible for the lack of, or limited, growth of the agriculture sector. These factors include: limited information and education about agricultural practices and markets; deteriorating and insufficient transport infrastructure; declining cash crop prices; pest and diseases (Port Moresby Chamber of Commerce and Industry, 2011); land issues; lack of extension services; other government priorities; an absence of a national plan for agricultural development (PNG Ministry of Agriculture and Livestock, 2007); social norms; and, factionalism (May 2009).

The main cash crops for agricultural export include oil palm (39 percent), coffee (31 percent), cocoa (20 percent), copra (7 percent), tea (2 percent), and rubber (1 percent) (Bourke & Harwood, 2009). Although cocoa ranks third after oil palm and coffee, in 2011, it generated an average of PGK320 million per year as export earnings (Bank of Papua New Guinea, 2012a). Cocoa is a common cash crop grown in the coastal lowlands of PNG and is produced by smallholder farming families, primarily in the tropical lowlands of East New Britain Province (ENBP), the Autonomous Region of Bougainville (ARB), and the East Sepik Province (ESP) (Bourke & Harwood, 2009).
1.2 IMPORTANCE OF COCOA FOR SMALLHOLDER FARMERS IN PNG

The sustainable generation of income from cash crops (e.g., cocoa) enables expenditure on education and health services for smallholder farmers, exceeding essential food items that cannot be easily accessed or produce locally such as rice and flour as well as food protein (24 percent) which are imported (Nelson et al., 2011).

An estimated 100,000-130,000 hectares of cocoa are grown by the 151,000 households (approximately one million people) in PNG who depend on cocoa for their livelihood (Nelson et al., 2011; Omuru, R. Nailina, & E. Fleming, 2001). The cash income generated from cocoa production is important to rural families, fundamental to meeting expenses associated with education, health, other goods and services, as well as customary obligations costs and church activities (Curry, Koczberski, Omuru, & Nailina, 2007b).

1.3 COCOA PRODUCTION IN PAPUA NEW GUINEA

Cocoa has been grown in PNG since its introduction by German settlers in 1900 as a plantation crop (PNGETCS, 1987). The industry was severely affected by World War II, when about two-thirds of PNG’s cocoa trees were destroyed. Following the war, despite global demand for cocoa increasing substantially, plantations could not be expanded due to land tenure issues in PNG. In the mid 1940’s, smallholder cocoa production was encouraged by Government (PNGETCS, 1987) and since then production has developed slowly.

Cocoa production currently occurs in most coastal PNG regions and dominated by three provinces; AR Bougainville (ARB), East Sepik (ES) and East New Britain provinces (Figure 1.1). The East New Britain Province (ENBP) was historically the leading province, but production levels there declined due to severe volcanic activity in 2004 and cocoa pod borer (CPB) infestation. There are other minor cocoa producing provinces, including Madang, West New Britain (WNBP), New Ireland, West Sepik (WSP), Morobe and Oro province. Figure 1.1 presents cocoa production for 2012, shown by provinces and in tonnes.
*Provinces with zero (0) production grow cocoa but production data are unavailable.

**Figure 1.1** Annual cocoa production in Papua New Guinea by province in tonnes, 2012.

*Source: PNG Cocoa Board (2016)*

Production levels have risen gradually over recent years from 25,860 tonnes in 2001 to 52,579 tonnes in 2008 ( ). However, in 2009/10, annual production from ENBP fell by over 60% because of losses to cocoa pod borer (CPB) (discussed in section 5.4), highlighting the vulnerability of the industry to pests and diseases. The ENBP loss in production was offset, at least in part, by increased production from the ARB and ESP areas (Nelson et al., 2011).

Cocoa pod borer (CPB) infestation reduced overall production in 2010 to 41,392 tonnes, increasing to 48,000 in 2011 due to increased export prices and production in some provinces, however, production declined thereafter.
1.3.1 Smallholder Cocoa

Smallholder farmers are defined as marginal and sub-marginal farm households that own and/or cultivate less than 2.0 hectares of land, are based predominantly in developing countries that farm using mainly family labour and for which the farm provides the principal source of income (Cornish, 1988).

In PNG approximately 87 percent of PNG’s cocoa is produced by small-holder farmers (Curry, Lummani, & Omuru, 2009b). Typically, smallholder farmers in the main cocoa producing provinces of ENBP and ARB achieve mean yields of between 300-400 kg of dry beans per hectare per annum (Curry et al., 2007b). This yield average is considerably lower than the potential yield of 2,500 kg of dry beans per hectare (J. Lummani, 2008) based on field trials of an improved variety (modified SG2 clone) in Tavilo (ENBP) and other CCIL cocoa fields under good management practices. Generally, yields of cocoa are relatively low in PNG compared to other countries with similar production methods. For instance, the small-holder cocoa yield in Malaysia is 1800 kg/ha, 800 kg/ha in Ivory Coast, and 360 kg/ha in Ghana (Food and Agriculture Organisation of the United Nations Statistics Division, 2006).
In PNG, smallholder cocoa producers are typically mixed farmers with a variety of cash income sources, including copra, garden food (sold at local markets), betel nut, vanilla, livestock, and trade stores (E Omuru, 2001) spreading their time, labour and inputs across a variety of enterprises, not just cocoa production. Cocoa is sold as either dry bean (fermented and dried) or wet bean (beans straight from cocoa pods), depending on various factors such as the age of their cocoa trees, yields, block condition and access to processing facilities (Curry et al., 2007b). Most small-holder cocoa farmers are wet bean sellers despite the prices for wet beans being lower than for dry beans, because it is costly to build a cocoa dryer to cure cocoa and to obtain cocoa dryer licences (E Omuru, 2001).

1.3.2 Government Investment in Cocoa Research, Development and Extension

Over the last two decades, there have been several cocoa industry investments and other efforts by the PNG Government, to improve cocoa yield (more details are provided in Chapter 5). Some programs involved agencies, international organisations, and other stakeholders (see Table 1.1)

Table 1.1 Government investments in cocoa research & development

<table>
<thead>
<tr>
<th>Period</th>
<th>Program/Interventions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>Price Stabilisation</td>
<td>Since the 1980's, The PNG Government has implemented various forms of price stabilisation schemes that aimed to give producers a stable income and a guaranteed minimum price to provide producers with incentives to maintain production during low commodity price cycles. The stabilisation funds have been exhausted and there has been no overall major impact of the policy changes to date.</td>
</tr>
<tr>
<td>1986</td>
<td>Cocoa Coconut Extension Agency (CCEA)</td>
<td>The Cocoa Coconut Extension Agency (CCEA) was established in 1986 to conduct all extension activities of both cocoa and coconut industries. This includes the Coconut Rehabilitation and Expansion Program (SCCREP) programs (see 1987 below). Various extension models and approaches such as Train &amp; Visit (T&amp;V), Farmer Field School (FFS) and the participatory approach were employed with variable success (Tumun, 2006). Along with each of the programs (SCCREP and extension models), researchers and extension officers attended both short and long term training. Training was also conducted for participating small-holder farmers in various aspects in cocoa management throughout the projects.</td>
</tr>
<tr>
<td>1981-1986</td>
<td>Cocoa and Coconut Research Institute (CCRI)</td>
<td>Cocoa research and development (R&amp;D) in PNG was carried out by the Department of Agriculture and Livestock (DAL) until 1981 when the Cocoa Research Company Limited (CRCL) was established. CRCL was then renamed as the PNG Cocoa and Coconut Research Institute (CCRI) and officially assumed responsibility in planning and implementation for all cocoa and coconut R&amp;D in 1986. Research programs at CCRI include cocoa and coconut agronomy, breeding, product quality improvement, downstream processing, entomology, plant pathology and economics.</td>
</tr>
</tbody>
</table>
Despite ongoing investment by the Government in the cocoa industry, production remains considerably lower than potential or compared to similar countries. The current research approach by the Cocoa Coconut Institute Limited (CCI) is towards aligning the agriculture research for development (AR4D) outcomes. In AR4D, research feeds into the development and this approach is expected to deliver better outcomes to the farmers (although any outcome is yet to be measured). Cocoa research and extension investment is captured within other more mainstream programs, rather than specifically targeting cocoa.

### 1.3.3 Development of Cocoa Technologies

The CCI continues to breed improved hybrid cocoa clones that are distributed to cocoa farmers. The CCI and its collaborative partners also developed an integrated pest and disease management (IPDM) package that included a training manual for smallholder sustainable cocoa producers (Konam, Namaliu, Daniel, & Guest, 2008) (see Chapter 5.3).

The CCI research has also investigated variable input options across diverse production situations. Low, medium and high input options were designed to cater for smallholder farmers from a range of backgrounds and resource capabilities, improving cocoa production (yield) and farm incomes in a progressive, stepwise approach (Daniel et al., 2011).

Furthermore, CCI and partner institutions (AgMark and PNG Cocoa Board) have invested in training of farmers on various aspects of cocoa production to farmers in most cocoa growing areas.
regions. The technologies developed and released to the smallholder farmers by CCI since 1982 are summarised in **Table 1.2**. However, the extent and degree of adoption by farmers of these technologies, including IPDM, and the impact of the application of these technologies on yield, has not been evaluated.

**Table 1.2 Technology developed and released by CCI**

<table>
<thead>
<tr>
<th>Program/Section</th>
<th>Period</th>
<th>Cocoa Technologies Developed &amp; Released</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocoa Breeding</td>
<td>1982</td>
<td>Improved cocoa planting materials:</td>
</tr>
<tr>
<td></td>
<td>1988</td>
<td>SG1*clone (1982),</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td>SG2*clone (1988) and Modified SG2 clone-big tall &amp; small short (1995). These clones also had some resistance to some common diseases. In 2000, the CCI provisionally released three varieties (small, intermediate and big) of polyclonal hybrid plants to the cocoa producers in PNG. This was followed by the formal release of the final eight (4 small and 4 big) hybrid clones in 2003.</td>
</tr>
<tr>
<td></td>
<td>2000/03</td>
<td></td>
</tr>
<tr>
<td>Plant Pathology</td>
<td>1982-2000</td>
<td>Control strategies for disease vectors, Vascular Streak Dieback (VSD), seedling blight and pod rot in seedling blight of cocoa, root diseases of cocoa, bark cracker of cocoa and pink disease of cocoa, Phytophthora disease with injectable potassium phosphate (PA), and additional strategies for Phytophthora pod rot control. Screening for Phytophthora resistance in cocoa cultivars, and chemical mixtures for cocoa disease control. Extension package of disease management based on disease cycle and cocoa cropping (phenological) cycle (IPDM)</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td></td>
</tr>
<tr>
<td>Cocoa Agronomy</td>
<td>1982/current</td>
<td>Agronomy information/extension packages released are as follows: Nutrition requirements in rehabilitation of old or mature stand of cocoa, economic benefits of slashing weeds monthly in comparison to the application of herbicides, formulation of new mixtures of herbicides, the rehabilitation of old cocoa trees by chupon grafting methods, and information and maintenance pruning of hybrid cocoa clones.</td>
</tr>
<tr>
<td>Cocoa Quality</td>
<td>2000</td>
<td>Micro fermentation method-able to ferment as low as 1kg of wet bean. Development of combination of hot air &amp; sun drying, solar/kiln combination dryers, and different types of sweat boxes and mini-boxes for fermentation.</td>
</tr>
</tbody>
</table>

SG1*: Seed Garden 1 clone; SG2*: Seed Garden 2 clone

**Source:** Tumun (2006)
While all the technologies listed in Table 1.2 were developed and released to the smallholder cocoa farmers, adoption of these technologies has not been evaluated.

1.3.4 Government Policy in Cocoa Production

In recent years, the PNG Government’s policies on Export Driven Economic Recovery Strategies (EDERS) and the National Agricultural Development Plan (NADP) 2007-2016 emphasised the improvement of food production and increasing export commodities (PNG Ministry of Agriculture and Livestock, 2007). Hence, as a consequence of the low levels of cocoa production, the PNG Cocoa Board (PNGCB) set a target in 2005 of 100,000 tonnes of dry bean production by 2016 (PNG Ministry of Agriculture and Livestock, 2007) but it has not been achieved (see Figure 1.2). Through the NADP, the government invested K246 million in the cocoa and coconut industries during the past decade. NADP’s priority for the development of the cocoa industry was to promote economic production for domestic consumption, export and downstream processing and value adding (PNG Ministry of Agriculture and Livestock, 2007).

The PNG Cocoa Board (PNGCB) also received funding from the World Bank through the Government of Papua New Guinea for a Productive Partnerships in Agriculture Project (PPAP) in 2011. Through the PPAP grants were provided toward the 2016 target for production partnerships in cocoa-growing areas to increase smallholder cocoa productivity, product quality, operational sustainability and improved cocoa farming systems.

1.3.5 Factors Affecting Smallholder Cocoa Production

Despite the investment in research, development and extension, limitations to cocoa productivity remain. Limitations to production based on findings in Curry et al., (2007) and Ghodake et al., (1995) revealed four main factors or limitations contributing to low levels of cocoa productivity across all PNG provinces and summary findings are presented now to enable the context of this thesis to be established.

1.3.5.1 Low Levels of Farm Management (Pest & Diseases)

Smallholder cocoa studies (George, 1994; Nicholls, 1989; Omuru & E. Fleming, 2001; Yarbro & Noble, 1989) conducted in ENBP reported inadequate weeding, pruning, shade control and pest
and disease control as limited production. Similarly Ghodake et al. (1995) and Daniel et al., (2011) identified poor farm management practices as a major constraint. Recommended pest management controls and practices were not adequately followed or incorrectly used. Curry et al. (2011) suggests that such poor management practices may be exacerbated by inadequate knowledge of proper management practices, low cocoa prices, labour constraints and land tenure issues.

1.3.5.2 Labour Shortage

Most smallholder households rely on unpaid family labour for cocoa management. Labour shortages result from a lack of cooperation amongst household members as a consequence of uneven distribution of money from cocoa earnings, an increase in the size of cocoa holdings (insufficient family labour relative to area of cocoa planted), and the rising cost of hired labour. High mobility and migration of family members due to education, marriage and leisure activities (such as visiting relatives in other provinces) have also contributed to the shortage of labour (Lummani & Nailina, 2001; Omuru & E. Fleming, 2001).

1.3.5.3 Land Shortage and Tenure

A number of researchers have identified land shortages in the Gazelle Peninsula (ENBP) as the major constraint in smallholder agricultural production and, for many smallholders, acquiring land was their only way to increase production (Fenbury, 1978; Ghodake, Cook, Kurika, Ling, Moxon, et al., 1995; Godyn, 1974; Lowe, 2006; Lummani & Nailina, 2001). Ghodake et al. (1995) noted that some cocoa farmers (male) were reluctant to plant cocoa on customary land (land that is inherited by matrilineal (female) inheritance principles) because of potential uncertainty about their tenure rights in the future due to the future standing of matrilineal land tenure implications. When tenure rights to cocoa planted on customary land are disputed, investment in, and maintenance of, the cocoa block typically ceases. Further study is needed to provide detailed analysis of the various ways in which land shortages or tenure affects production beyond limiting the area for cocoa expansion.

1.3.5.4 Low Cocoa Prices

Many smallholder studies conducted on the Gazelle Peninsula in ENBP have noted that cocoa prices greatly influence smallholder production (George, 1994; Godyn, 1974; Omuru et al.,
Commodity crop producers in PNG are considered to be price sensitive as the production levels tend to be positively correlated with market prices (Curry et al., 2007b). However, price interacts with production in several ways. Omuru and E. Fleming (2001) found that 85 percent of surveyed cocoa farmers in ENB said they would increase plantings of cocoa if prices were higher. Other studies on the Gazelle Peninsula report that cocoa maintenance levels and farm investment levels appear to decline with falling prices (e.g., Godyn, 1974; Moxon 1983 cited in Ghodake et al., 1995). During times of depressed prices, smallholders are also more likely to search for alternative farm and non-farm income sources to sustain their wellbeing (Godyn, 1974). The cocoa block can then become abandoned and act as a host to pests and diseases. The impact of low cocoa prices on access to family or hired labour for cocoa production has not been adequately explored in relation to other alternative farming (e.g. coconut and vanilla) or non-farm activities.

The four major constraints to cocoa production as mentioned above are complex in nature and government, research and extension effort has been put in to lessen the constraints over the years. Farming has been thought of as a technical issue involving applying science and imparting innovations from top-down process of technology transfer. Although some social analysis (labour shortage, land tenure) has been highlighted, there appears to be only limited consideration of the socio-cultural context in which smallholder production is embedded in broader social and cultural systems.

1.3.6 Cocoa studies in other cocoa producing countries

Consideration of empirical studies concerning farmers' technology adoption of tree crops (including cocoa) in some countries provides an overall insight into decision making about technology adoption and application by cocoa farmers, not just within PNG. In his study of innovation adoption in cocoa production in Ghana, Boahene (1995) concluded that farmers with an increased access to the extension services, or networks, accumulate higher levels of knowledge and hence adopt innovations earlier compared to others. In a case study of smallholders' cocoa in South Sulawesi in Indonesia, Pomp (1994) assessed the relative profitability of cocoa in comparison with other crops. Conclusions from the study were that compared to non-food crops (e.g. rubber and coconut), cocoa is a profitable crop, and that household income may be increased by planting cocoa trees.
In 1993 a study on the use of indigenous knowledge and technology by smallholder coffee growers in Indonesia showed that farmers experience good yield with an indigenous coffee variety (HY) without the need for expensive public replanting projects from extension agents (Tomich & Bennett, 1993). Indigenous knowledge (IK) is the local knowledge that is unique to a given culture or society. It is the basis for community level decision making in farming, health care, cookery, education, natural-resource management, and other livelihood activities in rural communities (Warren, 1991). In a study of low cocoa production in Ghana, a group of researchers identified biological and socio-economic factors as the main issues affecting cocoa production (Dormon, Van Huis, Leeuwis, Obeng-Ofori, & Sakyi-Dawson, 2004). The biological factors include the incidence of pests and diseases. The socioeconomic causes include economic drivers, such as low cocoa prices and social factors such as the lack of amenities (e.g. electricity, entertainment) which leads to out-migration, producing labour shortages and high labour costs.

From the various studies presented above, several points can be drawn on the process of technology adoption and application by cocoa farmers. Firstly, cocoa is potentially a profitable crop, particularly in comparison with other crops like coconut, so long as producers appreciate and respond to production and marketing signals. This crop can provide a great opportunity to improve farmers’ household income and economic development in the region. Secondly, the availability of and incentives for family labour, play important roles in the production/marketing system, roles that may bear on cocoa technology adoption and application. Thirdly, access to sources of information may be an important factor that influences the farmer’s ability to produce the cocoa crop. Fourthly, indigenous knowledge and socio-cultural influences form part of the suite of farmers’ skills, experiences and insights that are applied to maintain or improve their way of life.

1.4 THE PROBLEM STATEMENT

Despite the importance of cocoa (see Section 1.2), there are certain constraints contributing to its low productivity (E.g., Curry et al., 2007b e.t.c.; Daniel et al., 2011; Ghodake, Cook, Kurika, Ling, & Moxon, 1995; E. Omuru, 2001b; E. Omuru, R. Nailina, & E. Fleming, 2001) (see Section 1.3.5). The government and the cocoa industry have made commitments to reduce the constraints by investing considerably in research and extension to increase cocoa production (see Table 1.1). However, the range of cocoa technology developed (see Table 1.2) has been under-utilised and recommendations made from the research institutions (CCI, NARI) to improve cocoa production and extension approaches are yet to be realised.
At an industry level, cocoa productivity remains lower than potential (Daniel et al., 2011). Through their various activities, government and industry have highlighted that low cocoa production is a ‘problem’ that needs addressing, yet it has not been determined whether the smallholder producers share this viewpoint, or define it as a problem in the same way.

Smallholder farmers and their families are members of the society in which they live. In most PNG societies there are accepted ways of doing things and these ways are directly related to the culture of the society. Farmers’ attitudes and desires are influenced by their society's culture and tradition. Farmers want practical advice, but that advice must be based on socio-cultural understanding (Vanclay 2004). Farmers have the final say in how they perceive a program or innovation, and that is central to adoption and the sustainability of a program or innovation in a social system (Vanclay 2004). PNG smallholder production is embedded within a broad range of cultural systems (Curry et al., 2007b). It is therefore important to recognise smallholder production as part of a socio-cultural system and to understand the nature of the livelihood in which the potential adopters (smallholder farmers) are embedded and the degree of interconnectedness.

Farmers are not only farming, and part of a socio-cultural system, but they are also into other activities to sustain themselves, hence, much recent thinking on the nature of socio-cultural systems and farmers’ livelihood is based on the concept of livelihood diversification as a survival strategy of rural households in developing countries (Chambers & Conway, 1992; Ellis, 2000b) (see Section 4.3.2). Frank Ellis (1998, p. 6), further defined livelihood diversification as ‘a process by which rural households construct a diverse portfolio of activities and social support capabilities in their struggle for survival and improvement in their standards of living’. Farming remains important, but rural people are looking for diverse opportunities to increase and stabilise their incomes (Ellis, 2000b).

In the context of agricultural research and extension approaches in PNG, the rationale for research and extension in agriculture are mainly tailored towards improving innovations and productivity (Omuru, 2001b) (see Section 1.3.3 and 13.1.3), assuming that all farmers would eventually see the benefit of new innovations and thus adopt them (Botha & Atkins, 2005). The prevailing extension model (approach) is based on the capitalist based farming system described by Rogers’ (2003). Rogers’ innovation adoption-diffusion model or theory (see Section 2.3) is grounded on capitalist based farming with the intention of profit making as opposed to farmers
in PNG whom are subsistence based (Simmonds, 1985). No known work has been done to consider the perception of extension and research agents towards the farmers’ livelihood and why farmers make certain decisions in the manner they do. Nor is there any documented research that might reveal how and why farmers choose or prioritise their livelihood activities including their farming strategies. Similarly, there are no apparent studies capturing smallholder cocoa farmers’ own perception of why they are doing what they are doing.

Given the circumstances in PNG, where research and extension in cocoa are mainly geared towards achieving profit oriented goals through improving innovations and increasing productivity, there is a knowledge gap concerning smallholder cocoa farmers’ beliefs and rationales for the things they are (or are not) doing. Understanding such phenomena may raise awareness and increases insight of the farmers’ way of life when dealing with them. Hence, the research objectives and questions are presented next.

1.5 RESEARCH OBJECTIVES

The research aims to understand the livelihood systems of cocoa farmers, their perspective of livelihood, and the factors influencing on decision making in undertaking certain livelihood strategies (including cocoa).

The objectives of this study are to:

a. Identify the elements and associated factors that constitute a livelihood system amongst smallholder cocoa producers;

b. Examine the range of activities that constitutes a livelihood perspective;

c. Determine the factors influencing the farmer decision making process across various livelihood activities; and

d. Explore the research, development and extension agent’s perceptions of the smallholder cocoa farmers on issues on cocoa production.

The following research questions are explored:

1. What is the nature and extent of the livelihood system of smallholder cocoa farmers in the study areas?

2. What are the factors influencing the farmers’ decision-making about their choice of livelihood activities (including cocoa production)?
3. What are the researchers’ and extension workers’ perceptions of the smallholder cocoa farmers and their understanding of cocoa issues?

This research seeks to understand the farmers’ environment and way of life, including their perception on the relative importance of cocoa production compared to other livelihood elements. Having such understanding may then provide some directions to researchers and extension agents and agencies in the appropriate way to approach farmers by taking into account farmers’ livelihood as well as technical inputs in cocoa production in PNG.

1.6 THESIS OUTLINE

The thesis consists of eleven chapters. The introductory chapter presents a brief background of cocoa production in Papua New Guinea (PNG), including the importance of cocoa, factors affecting cocoa production, and government’s investment in cocoa industry. It then introduces the research problem that defines the main interest of the study.

The next four chapters are part of the literature review, beginning with Chapter 2 that reviews the theories behind the innovation adoption process and decision-making. This provides an understanding of the various theories and models of decision-making and technology adoption processes, factors affecting adoption of agricultural innovations and features of the adoption process.

Chapter 3 reviews the range of general agricultural extension practices carried out in developing countries. This provides an understanding of different agricultural extension approaches, paradigm shifts, and ways of measuring extension outcomes in order to have a better insight into the mechanism and application of extension in farming communities especially in developing countries.

Chapter 4 defines smallholder agriculture and provides a conceptual framework of a Sustainable Livelihood Approach (SLA) that was adapted in this study. This chapter defines livelihood and the components of livelihood systems and proposes how the Sustainable Livelihood Approach can be applied in identifying the key factors that affects the farmers’ decision-making in livelihood activities including cocoa production and adoption of cocoa technologies.
Chapter 5 is the final literature review chapter that reviews the PNG Government’s investment in cocoa development in order to draw an understanding and insights of the trends of cocoa developments, opportunities, and challenges of research, development and extension system in PNG.

Chapter 6 provides the research design and methodology of this study including a description of study sites, methodological approach, and survey methods and data organisation.

Chapters 7, 8, and 9 present the research findings categorised into three (3) main topics, accordingly; the human settings of the study areas; the assets and livelihood strategies; and enabling agents that influence cocoa production and limitations.

Chapter 10 is the discussion chapter that explains the context of these key findings (outlined in Chapters 7, 8 and 9) and establishes key factors that affect the farmers’ livelihood and cocoa production and its relevance and implications in relation to literature and the theoretical insights of this study.

Finally, Chapter 11 concludes this thesis by presenting a summary of the key findings from this study, as well as implications and suggestions for the future direction of research.
CHAPTER TWO: INNOVATION DIFFUSION & DECISION MAKING

THEORY

The previous chapter provided a brief review of agriculture in PNG including the importance of cocoa to the country and the major factors that affect cocoa production. The chapter concluded by detailing the specific interest of the research in understanding smallholder farmer perspectives of livelihood, the relative importance of cocoa production within those perspectives and the potential implications that an understanding of livelihood could have for cocoa production in PNG.

This chapter represents the first of four chapters of literature review. It considers the theoretical perspectives on innovation diffusion process and adoption. Then provides an analysis of the theories and models of decision making, especially to agricultural production.

2.1 INTRODUCTION

One of the fundamental goals of agricultural research and extension is to research and develop new approaches and technologies, and see them adopted by the rural farmers (Gérard Viatte, 2000) for improved and profitable outcomes. The role of extension and information transfer is considered in detail in Chapter 3, however the basis to understanding extension and adoption processes requires also understanding theories of innovation diffusion and decision making.

This chapter considers the theoretical insight of innovation diffusion, particularly the contribution of Rogers (Rogers, 2003). The diffusion of innovation theory reviewed here is mainly on the basis of definitions and concepts of Rogers (2003), and Rogers and Shoemaker (1971). The Rogers’ DOI Theory and decision making process are fundamental and it is important to understand the potential adopters and their decision making processes. The chapter further provides an overview and analysis of the decision models, before ending with a summary.

2.2 THE DIFFUSION OF INNOVATION STUDIES

The study of the diffusion of innovations takes its roots from the ideas of imitation theories and observations of Gabriel Tarde (Rogers, 2003). According to Rogers, Tarde considered imitation, whether conscious or unconscious, as a fundamental interpersonal trait. Tarde established the concept of opinion leadership as a key diffusion concept, the S-curve of diffusion, and the role
of socioeconomic status in interpersonal diffusion, although he did not use such names for these concepts. Such theoretical ideas were set forth by Tarde (1903) in his book, *The Laws of Imitation* (Rogers, 2003). After four decades Bryce Ryan and Neal C. Gross’s classic study of the diffusion of hybrid corn seed among Iowa farmers in 1943 gave rise to the research paradigm for the diffusion of innovations (Rogers, 1962).

The diffusion of innovations model is a conceptual paradigm with relevance to many disciplines (Rogers, 2003). For example; in communication and marketing (Hoffmann 2011); public health (Greenhalgh, Robert, Bate, Macfarlane, & Kyriakidou, 2005); intervention development (Dearing, 2009); rural sociology; Anthropology; communication development; and agriculture (Rogers, 2003; Rogers & Shoemaker, 1971; Ryan & Gross, 1943). These disciplines have a long tradition of trying to understand present behaviour in terms of patterns of diffusion of techniques and ideas from the source societies to their present distributions (Hoffmann 2011; Rogers, 2003).

Virtually all of these are studies of situations where change agents are trying to diffuse scientific or technical innovations to a clientele. The remarkable facet of this literature is that most innovations examined are the outcome of attentively technical interventions, hence they need to be practical rather than just a new technology that people unsure to adopt or reject (Hoffmann 2011). Thus understanding the theoretical base of DOI concepts is important in order to appreciate its applications and impacts.

### 2.3 DIFFUSION OF INNOVATIONS THEORY AND CONCEPTS

Diffusion of innovations is a theory that seeks to explain how, why, and at what rate, new ideas and technology spread through cultures (Rogers, 1962). Research in diffusion examines how ideas are spread among groups of people. It is important to be familiar with key Diffusion of Innovations (DOI) terms and concepts in order to understand the underlying theories and process.

**a) Adoption**

The “process by which a farmer is supposed to consider and reject or accept to practise a particular innovation” is referred to as adoption of an innovation by Moshler (1986, p. 97). To Adams (1990, p. 93), adoption is “a process, which involves the decision to make full use of an innovation as the best course of action available”. Feder, Just et al. (1985, p. 256), defines adoption as “the degree of use of a new technology in the long-run equilibrium when the farmer
has full information about the new technology and its potential”. Rogers (2003, p. 177) however, defines adoption as “a decision to make full use of new technologies as the best course of action available”. The adoption of technology is a process that takes time from introduction to complete adoption. The farmer’s decision to accept (adopt) or reject an innovation or technology consists of several stages and involves a sequence of thoughts and decisions.

b) Diffusion
Rogers (2003, p. 19) stated that diffusion is “the process in which an innovation is communicated through certain channels over time, among the members of a social system”. As expressed in this definition, innovation, communication channels, time, and social system are the four key components of the diffusion of innovations. It is a special type of communication, in that the messages are concerned with new ideas. It is this newness of the idea in the message content of communication that gives diffusion its special character.

The diffusion of innovation theory is essentially a social process in which subjectively perceived information about a new idea is communicated, and further analyses how a person adopts the new innovative ideas, and considers how they made the decision towards adopting it (Rogers, 2003). Both mass media and interpersonal communication channels are involved in the diffusion process. The theory heavily relies on human capital. According to the theory, innovations should be widely adopted in order to attain development and sustainability (Rogers, 2003). In real life situations the adaptability of the culture plays a pivotal role wherever the theory is applied. Rogers proposed four elements of diffusion of innovations as follows:

i) Innovation,

ii) communication channel,

iii) time, and

iv) social system.

Each element is briefly explored below.

2.3.1 Innovation
One of Rogers’ key insights was his concept of innovation which he defined as an “idea, practice, or object that is perceived as new by an individual or other unit of adoption” (2003, p. 12). An innovation can include tangible (material) objects such as a new hybrid seed or device. An innovation may also be intangible (non-material), such as a new cocoa fermentation process or an integrated pest management technique. An innovation that might seem familiar to some may
be new to others. By defining innovation in this way, Rogers effectively crosses the hurdle between disciplines and allows for ready consideration of adoption studies from various fields apart from agriculture. With such a broad scope, the commonalities in findings from various studies are more potent and have wider applicability (Rogers, 2003). In addition, Rogers claimed that people may perceive some degree of uncertainty in the newness of the innovation. Thus, they are motivated to seek further information about the innovation in order to cope with the uncertainty that it creates (Rogers, 2003). Such action is a process in relation to deciding whether or not to accept or reject the innovation based on prior knowledge of the innovation, hence the next section deliberates on the complex innovation decision process.

2.3.2 The Innovation Decision Process

According to Rogers (2003, p. 169), the innovation-decision process is “the process through which an individual or other decision making unit, passes from first knowledge of an innovation, to forming an attitude towards the innovation, to a decision to adopt or reject, to implementation and use of the new idea, and to confirmation of this decision”. The process consists of a series of actions and choices over time through which an individual evaluates a new alternative to those previously in existence, and this can be conceptualised to five stages: knowledge, persuasion, decision, implementation, and confirmation as outlined in the innovation-decision process framework or conceptual model in Figure 2.1 A conceptual model of five stages in innovation-decision process

1. Knowledge stage. Knowledge occurs when an individual or other decision making unit is exposed to an innovation’s existence and gains some understanding of how it functions as well as its benefits (Rogers, 2003). In this process the farmer is looking for information about a new technology, especially in order to reduce the uncertainty of the disadvantages and consequences from the adoption of the new technology (Haider, 2004; Hornik, 2004). In this stage Haider (2004, pp. 164-168) mentions that the awareness of knowledge relates to the process of familiarising oneself (cognitive process) with an innovation (awareness knowledge), how to use it (how-to knowledge), and what the innovation is for (principle knowledge).

2. Persuasion stage. Persuasion occurs when an individual or any other decision making unit forms a favourable or unfavourable attitude towards the innovation (Rogers, 2003). The persuasion function is mainly affective or related to feeling. At this stage the individual
becomes more psychologically involved with the innovation and actively seeks information about it. The individual perceives the attributes of the innovation, which is conditioned by one’s personality and social system norms, and develops a general idea about the innovation (Haider, 2004, pp. 169-172).

In developing a favourable attitude towards the innovation, an individual may mentally apply the new idea to the present or anticipated future situation before deciding whether or not to try it. There may be two levels of attitudes - a previous positive experience helps the process, and a negative experience (for example, crop failure), develops resistance to future new ideas (Rogers, 2003). Normally at this stage towards decision making, the individual’s focus is on finding reliable sources of information, for example, from fellow farmers whose subjective opinion of the innovation based on their personal experience, is more convincing. Normally when someone gives a positive evaluation, people are often motivated to adopt it.

3. **Decision stage.** A decision occurs when an individual or some other decision making unit engages in activities that lead to a choice to adopt or reject the innovation (Rogers & Shoemaker, 1971). The individual trials the innovation in a small-scale trial or observes the trials performed by their peers. Considering the relative advantage (see Section 2.4.3), the risks involved, and many other related factors (e.g., availability of markets, costs, needs etc.), the individual takes a decision to adopt or reject the innovation. Based on this trial or observation there is a choice to adopt or not to adopt the new technology.

4. **Implementation stage.** Implementation occurs when an individual or other decision making units puts an innovation into use (Rogers, 2003). This is the stage the individual is generally concerned with where to get the innovation, how to use it, what operational problems will be faced, and how these could be solved. Implementation may involve changes in the management of the enterprise and/or modification in the innovation, to suit more closely the specific needs of the particular person who adopts it. Re-invention often occurs at the implementation stage. Re-invention is defined as the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation (Ray, 2003).

Recognition of the existence of re-invention brings into focus a different view of adoption behaviour instead of simply accepting or rejecting an innovation as a fixed idea. It is often
the case that innovative farmers normally participate in the adoption diffusion process based on their vast experiences, thus as a process of social construct (Rogers, 2003).
Figure 2.1 A conceptual model of five stages in innovation-decision process

Source: Rogers (2003, p. 165)
5. **Confirmation stage.** Confirmation occurs when an individual or some other decision making unit seeks reinforcement of an innovation-decision already been made, or reverses a previous decision to adopt or reject the innovation if exposed to conflicting messages about the innovation (Rogers, 2003). The human mind is in a dynamic state and an individual constantly evaluates the situation. Depending on the outcome, if the individual perceives that the innovation is giving satisfactory or unsatisfactory results, the person may continue to adopt or reject the innovation depending on the circumstances. Reversal of the decision after adoption or rejection of an innovation may, however, take place at a later stage. In any case the adoption or rejection of an innovation may also depend on the attributes of the innovation.

2.3.3 **The Attributes of Innovation**

Byerlee and Hesse de Polaco (1982) described the attributes of innovation as characteristics of the innovation itself, and demonstrated that farmers followed a stepwise approach to adoption of a package that reflects the characteristics of each component and the interaction between them. These characteristics are: profitability, riskiness, divisibility, complexity, and availability of necessary inputs. Rogers (2003) however, developed five characteristics or attributes from the farmer’s point of view which affects the adoptability of an innovation, namely:

i) Relative advantage,

ii) Compatibility,

iii) Complexity,

iv) Trialability, and

v) Observability

2.3.3.1 **Relative advantage**

This is the degree to which an innovation is perceived as better than the idea or object it is intended to replace (Rogers, 2003). The underlying principle is that the greater the perceived relative advantage of an innovation, the more chances its rate of adoption. The acceptance of an innovation is thus in relation to economic gains, social prestige factors, satisfaction and convenience associated with it (Rogers, 2003). Adams (1990) claims that sometimes the relative advantage of an innovation is enhanced by reducing its cost and also by subsidies. The more tangible the benefits of an innovation, the more farmers may be willing to adopt it.
2.3.3.2 **Compatibility.**

This is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 2003). The innovation should fit in better with the user’s requirements than the features of the innovation itself. The more compatible the innovation is with the user’s lifestyle and their mindset, the more likely it is to be adopted (Anthony, 2012).

2.3.3.3 **Complexity.**

This is the extent to which an innovation is considered difficult to use or be applied (Rogers, 2003). It is the extent of intricacy that the prospective adopter faces with the innovation (Anthony, 2012). That means the more difficult an innovation is in terms of usage and understanding the less chances it will be adopted and the slower the diffusion rate. According to Rogers, some innovations are readily understood by most members of a social system, while others are more intricate and will be adopted more slowly.

2.3.3.4 **Trialability.**

This is the extent to which an innovation may be tested out to see its practical application (Rogers, 2003). The ability to trial an innovation may reduce the tension of adoption (Anthony, 2012). A farmer is likely to adopt an innovation which he has tried first on a small scale on his own farm and which proved to work better than an innovation he had to adopt immediately without experimenting and considering the risk involved..

2.3.3.5 **Observability.**

This is the extent to which the outcome of the innovation is easily seen by others. The easier it is for individuals to see the results of an innovation, the more likely they are to adopt (Rogers, 2003). Farmers are more inclined to adopt an innovation after seeing its results than when results are not easily seen. It is important that the attributes of an innovation are imparted in order to persuade end users of their value, thus communication channel become paramount.
2.3.4 Communication Channels

The second element of the diffusion of innovation process is the ‘communication channel’. According to Rogers (2003, p. 5), communication is “a process in which participants create and share information with one another in order to reach a mutual understanding”. Communication occurs through channels between sources. Rogers (2003, p. 204) described it thus: “a source is an individual or an institution that originates a message. A channel is the means by which a message gets from the source to the receiver”.

Rogers asserts that diffusion is a specific kind of communication. Messages get from one person to another through a communication channel. There are number of communication channels but mass media channel is thought to be appropriate and effective in driving change in attitudes towards a new concept, consequently influencing the person to adopt or reject the new concept. It is for this reason that one of the change agent’s roles is to identify and use a relevant and effective communication channel for better uptake by end users.

2.3.5 Time

The third element in diffusion of innovation process is ‘time’. Rogers (2003), argues that the inclusion of the time dimension in diffusion research is paramount. The ‘time’ dimension is involves:

i) The innovation-diffusion process (see Section 2.4),

ii) Adoption categories (Innovativeness), and

iii) Innovation’s rate of adoption,

All these processes occur over ‘time’ and are vital. The diffusion of innovation process was discussed in Section 2.4. The adoption categories and rate of adoption are discussed below.

2.3.6 Social System

The final element of the diffusion of innovation process is the social system where a set of integral entities are engaged in analysing and solving problems to achieve common outcomes. The members of a social system are made up of individuals, groups, or organisations (Rogers, 2003). The sharing of common goals binds the system together. The social structure affects the innovation’s diffusion in several ways:
1. Since diffusion of innovations takes place in the social system, it is influenced by the social structure of the social system. Hence the nature of the social system affects the individuals’ innovativeness which gives rise to the main criterion for categorising adopters (see Section 2.5).

2. Social system norms are established behaviour patterns for the members of a social system and greatly influence social change. According to Rogers and Shoemaker (1971), the individuals in a social system with modern norms view change favourably, disposing them to adopt new ideas more rapidly than individuals in traditional systems.

3. Roles of opinion leaders and change agents. According to Rogers (2003, p. 27), an opinion leadership is “the degree to which an individual is able to influence other individuals’ attitudes or overt behaviour informally in a desired way with relative frequency”.

   In a modern social system, opinion leaders are innovative. However, in traditional social systems, opinion leaders may be indicative of traditional behaviour and norms adhering to local values and practices, and are, in some cases, even strongly against changes or external influences (Sahin, 2006). A change agent is “an individual who influences clients’ innovation-decisions in a direction deemed desirable by a change agency” (Rogers, 2003, p. 27). Change agents generally encourage adoption of a new idea, and usually work with opinion leaders to enhance the impact of their diffusion activities in a social system (Rogers, 2003; Sahin, 2006).

4. The next effect, the types of innovation decisions, was discussed above in Section 2.4.2.

5. And finally there are the consequences of innovation. Consequences are the changes that occur to an individual or to a system as a result of adoption or rejection of an innovation (Rogers, 2003).

2.4 ADOPTER CATEGORIES

Innovations are not adopted by all individuals in a social system at the same time. Instead, they tend to be adopted in a time sequence, and can be classified into adopter categories based upon how long it takes for adopters to begin using the new idea, or on the basis of their innovativeness (Rogers, 2003). Rogers (2003, p. 22), stated that ‘innovativeness is the degree to which an
individual or other unit of adoption is relatively earlier in adopting new ideas than other members of the system’.

The adoption of an innovations can be plotted over time and normally forms a bell-shaped curve. Figure 2.2 shows that the distribution of the adopters may be categorised into five adopter categories by using the mean and standard deviation.

![Figure 2.2 Adopter categories on the basis of Innovativeness](source: Rogers (2003, p. 247))

The five adopter categories are conceptualised as ideal types. The important characteristics of the adopter categories are discussed in brief.

1. **Innovators.** They are venturesome and the first to adopt a new idea, much ahead of other members in the community. They are generally very few in number. They are cosmopolite and their range of influence and activity may go beyond the community boundaries. They often seem to be well educated and mentally alert and have good contacts with external sources. They are oriented to take risks, have large size resources including finance to absorb any possible losses due to adoption of the innovation. They also have more prestige in the community (Ray, 2003; Rogers, 2003; Sahin, 2006).

2. **Early Adopters.** Early adopters are generally literate and are usually opinion leaders. They have more financial lucidity, are participative and maintain good contact with cosmopolite resources of information. They are the quickest to use ideas that were tested in their own situation (Ray, 2003; Rogers, 2003; Sahin, 2006).

3. **Early Majority.** They adopt new ideas just before the average members of the community. They are neither very early nor relatively late to adopt an innovation. They are deliberate
and take a longer time to make the decision to adopt, in comparison to the innovators and early adopters. They do not hold leadership positions in adoption, but actively participate in extension programmes such as training, demonstration, field days and so on. They are slightly above average in education, social and economic status, and are experienced about the enterprise. Due to their limited resources, they cannot take hasty or poor decisions. They have less contact with cosmopolite sources of information. They are active locally and associate mainly with the people of their own community and so members of the community seek information about innovation from them (Ray, 2003; Rogers, 2003; Sahin, 2006).

4. **Late Majority.** They are cautious and sceptical, and adopt new ideas just after the average members of the community. They adopt mainly because people have already adopted the innovation and are getting the benefit out of it. They have low levels of education, low levels of participation, and depend mostly on local sources of information (Ray, 2003; Rogers, 2003; Sahin, 2006).

5. **Laggards.** They are traditional and the last to adopt an innovation. By the time the laggards finally adopt an innovation, it may already have been superseded by a more recent idea which the innovators are already using. They are mostly ‘local-ites’ and primarily interact with those who have traditional values. They are often suspicious of innovations, innovators, and change agents. They have little or no education, are the least participant and have hardly any contact with the outside world. They are generally resource poor people (Ray, 2003; Rogers, 2003; Sahin, 2006).

2.5 **INNOVATION RATE OF ADOPTION**

Rogers (2003, p. 221) stated that rate of adoption of an innovation “is the relative speed with which an innovation is adopted by members of a social system”.

It is generally measured as the number of individuals who adopt a new idea in a specified period, for example, each year. In fact, the rate of adoption is a numerical figure indicating the steepness of the adoption curve for an innovation. The perceived attributes of an innovation are the most important basis that explains the rate of adoption of an innovation (Rogers, 2003). In addition to the five perceived attributes of an innovation (see Section 2.4.3), other variables that affect an innovation’s rate of adoption include:
- the type of innovation-decision,
- the nature of communication channels diffusing the innovation at various stages in the innovation-decision process,
- the nature of the social system in which the innovation is diffusing, and the extent of change agents' promotion efforts in diffusing the innovation (Figure 2.3).

Figure 2.3 The variables which influence an innovation’s rate of adoption  
Source: Rogers (2003, p. 207)

2.6 INNOVATION - DECISIONS

Rogers (2003) classified three types of innovation-decisions, which are related to an innovation's rate of adoption.

- **Individual (optional)** innovation-decisions are made by individuals who make choices to adopt or reject an innovation apart from other members of the system.
- **Collective** innovation-decisions are choices to adopt or reject an innovation that are made by the members of a group or community.
• **Authority** innovation-decisions are choices to adopt or reject an innovation made by a minority in a system who possess power, status, or technical expertise. The individual members of the society actually decide and implement the decision.

According to Rogers (2003), individual decision making generally leads to adoption of innovation more rapidly than when an innovation is adopted by a group. The more persons involved in making an innovation-decision, the slower the rate of adoption. The rate of adoption of an innovation may also be influenced by the type of communication channel used (see Figure 2.3).

### 2.6.1 Communication Channels.

The rate of adoption of innovation depends on the relationship between communication channels and the attributes of the innovation. If an inappropriate communication channel is used for complex new ideas (for example, mass media), a slower rate of adoption results (Rogers, 2003).

### 2.6.2 Nature of the Social System

**Figure 2.3** shows that the nature of the social system, such as the norms, traditions, culture, etc., and the degree to which the communication network structure is highly interconnected, also affects an innovation's rate of adoption (see Section 2.4.6 for details) (Rogers, 2003).

### 2.6.3 Extent of Change Agents

An innovation's rate of adoption is also affected by the extent of change agents' promotion efforts. The relationship between rate of adoption and change agents' efforts, however, may not be direct and linear. The greatest response to change agent effort occurs when opinion leaders adopt (early adopters). The innovation will then continue to spread with little promotion by change agents, after a critical mass of adopters is reached (Rogers, 2003). Although the change agents may promote the effort in imparting the information or innovation through communication processes over time, it is in the social structure and system where changes take place.

The four elements of diffusion of innovation as described above give a wider understanding of the attributes that define and describe the process of how information and innovation is
communicated through a social system and adopted or rejected by an individual, group, or organisation. The next section elaborates further on possible factors hindering adoption of agricultural innovation(s) by farmers.

2.7 FACTORS AFFECTING FARMERS’ ADOPTION OF AGRICULTURAL INNOVATIONS

There is much literature on the adoption of agricultural technology (For example, Feder & Umali, 1993; Rogers, 2003; Sahin, 2006; Sunding & Zilberman, 2001). In a review, Pannell et al. (2006) stated that the uptake of agricultural technology depends on a range of factors including personal, socio-cultural and economic factors, as well as on the attributes of the innovation itself (Adesina & Zinnah, 1993; Rogers, 2003). Prokopy et al. (2008) argued that education levels, capital, income, farm size, access to information, positive environmental attitudes, environmental awareness and utilisation of social networks are generally positively associated with the adoption of best management practices.

In the agricultural economics discipline, literature on technology adoption emphasises the role of fixed and variable costs, whether in terms of structural farm factors such as size or land quality, or the characteristics of farmers in terms of human capital (Sunding & Zilberman, 2001). Focusing on factors outside the farm gate, Miller and Tolley (1989) reported that market interventions such as price supports can speed up the adoption of new technologies. In particular, the relative complexity, risk and investment characteristics of technologies significantly affect their adoption and diffusion (Batz, Peters, & Janssen, 1999). The risk preferences of farmers are also important in influencing the technology adoption decision, especially if capital-intensive technology costs are irreversible (Sunding & Zilberman, 2001).

Furthermore, most sociological research on innovation adoption reveals that adoption is affected by the attributes of the society in which users are entrenched (Selwyn, 2003; Slowkowski & Jarratt, 2007). Haggman (2009) mentioned that understanding the relationships between users may be more critical than factors relating to the innovation itself. Some economists and other social scientists have focused especially on farmers’ motivations, values, objectives and behavioural influences in the context of technology adoption (For example, Glasser, 1999; Maslow, 1970; Rehman et al., 2007). Other studies indicated that linkages and communication with extension services (Butcher, 1998; Garforth, Angell, Archer, & Green, 2003; Millar, 2010) and peer-group behaviour (Sauer & Zilberman, 2010) do have some positive impact on farmers’ decisions on adoption of innovation.
The application of the diffusion of innovations theory has been shown to be effective in gaining adoption of many types of innovations across a wide variety of settings, however, it has its flaws, and they are discussed in the next section.

2.8 FLAWS OF ROGERS’ DIFFUSION OF INNOVATIONS THEORY

The Diffusion of Innovation theory is a relevant model to many disciplines and topics. The theory enjoys much popularity among a wide variety of academic disciplines, public agencies, and private firms in providing insight into adoption decisions and strategies for gaining adoption (Botha & Atkins, 2005). The approach functions in many settings worldwide, and it has done so for many years. According to Hornik (2004), it serves as the foundational way to understand something about every social change program in the world. Despite its dominance for decades in a wider setting, including capitalist based farming systems, it has several well-known weaknesses.

2.8.1 Pro-Innovation Bias

It is the assumption that the innovation should be disseminated and adopted by all members of the social system on the basis that the innovation should not be rejected (Rogers, 2003) and that assumption has been accepted widely. According to Kole (2000) Rogers’ innovation diffusion theory is technology driven because of its pro-innovation bias. Pro-innovation bias implies that all members of a social system should adopt innovations and adoption should happen more quickly (Kole, 2000).

The pro-innovation bias initially occurred during the study of the diffusion of hybrid corn seed in Iowa in 1927 by Ryan & Gross (Rogers, 2003). Hybrid corn was profitable for the Iowa farmers in the early diffusion study (Ryan & Gross, 1943), but most other innovations that have been investigated do not have this extremely high degree of relative advantage (Hoffmann 2011). Perhaps if the field of diffusion research had not begun with capitalised based, highly profitable agricultural innovations in the 1940s and the 1950s, the pro-innovation bias would have been avoided, or at least recognized and accounted for (Hoffmann 2011; Kole, 2000). As a result of pro-innovation bias, the current research, development and extension agent brings about challenges in thinking capacity (Rogers & Shoemaker, 1971, pp. 78-79).
2.8.2 The Individual-Blame Bias

The individual-blame bias refers to a tendency to blame individuals for their non-adoption (Caplan & Nelson, 1973). Kole (2000) claims that diffusion theory focuses on the individual adopter and disregards social structures. It is important for change agents to understand non-adoption rather than merely focusing on individual adopters because not all laggards are oblivious, resistant to change, or otherwise personally liable to reject new technologies (Edward, 2015).

1. Source-bias

There has also been a tendency for diffusion research to side with the change agencies that promote innovations rather than with the audience of potential adopters (farmers) (Rogers, 2003). Funding agents and sponsors seem to have influence over the research and change agents to pursue their interest rather than considering the adopters’ (farmers) needs (Hoffmann 2011).

2. Profit oriented (productivity)

Three major underlying assumptions of the diffusion of innovation theory are that markets are perfectly competitive, profitability is the key driver, and production and consumption decisions are separable (Langat et al., 2013). This is contrary to the economic environment of rural households, especially in developing countries, which is often characterised by imperfect or missing markets and subsistence orientation, resulting in non-separability of the household production and consumption decisions. (Langat et al., 2013).

3. Other limitations

Kole (2000) further indicates that the diffusion of innovation theory does not take into account that the process may fail. The diffusion theory does not consider seriously the possibility that people will reject an innovation even if they fully understand it (Waterman, 2004). Kole further stated that the DOI model associates the latest technologies with progress, thereby ignoring alternatives.

Nutley, Davies et al. (2002) argued that understanding the way knowledge is used in the diffusion of innovations is further complicated by lack of understanding the difference between direct adoption (replication) and reinventing (adaptation). Early diffusion studies (Ryan & Gross, 1943) assumed that adoption of an innovation meant the exact imitation of how the innovation
had been used originally. However, following the work of Charters and Pellegrin (1972), the accepted wisdom now recognises the concept of reinvention – defined as the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation (Hays, 1996; Rogers, 2003).

There are limitations of the DOI model, and unique pathways that affect different social systems, thus it is not proper for change agents to provide blanket advice, but rather on a needs basis, especially in developing countries. When considering the dynamics of the diffusion approach in gaining adoption, change agents must be aware of the consequences that accompany the application of diffusion strategies. The basis of best-fit approaches involves imparting innovations and services that are appropriate, pluralistic and needs based, particularly in developing countries. It is an opportunity to make research and extension flexible enough to deal with current and future rural development issues and crises.

2.9 RELEVANCE OF DIFFUSION OF INNOVATION IN DEVELOPING COUNTRIES

Diffusion of innovations (DOI) is at the basis for change in the context of improving productivity and economic development and so it is significant for any developing countries. However, in reality the process of DOI is still a challenging matter for researchers, especially in understanding the dynamics of the decision making process by farmers in adopting (or rejecting) agricultural innovation (Léger & Swaminathan, 2007). For example, farmers are affected by a number of factors including socio cultural, personal, and external factors. Not much research work has been done on DOI to understand its dynamics and its complexity in the developing countries (Ohlmer, Olson, & Brehmer, 1998).

Despite many researchers (see for example Rogers, 1962; Rogers with Shoemaker, 1971; Robertson, 1971; Katz et al., 1963 and Zaltman, 1965), recognising the importance of cultural influences upon the diffusion and adoption processes, less in-depth work has been done on analysing the dynamics of culture. It is known that culture is an important attribute of the social system but it is often difficult to understand the implications of this.

DOI is a theory about how change occurs and it is comprised of several elements that are communicated through a social system. In western developed countries the rationale behind applying DOI to agriculture mainly refers to capitalist systems aiming to increase productivity
(Rogers, 2003). Thus the capitalist approach was introduced to the developing countries by change agents, and although it hasn’t been very successful, it continues to drive change systems.

It is thus important to understand farmers’ decision making processes and the dynamics of DOI, since it is relevant to its application by developing countries (Ndesaulwa & Kikula, 2016). DOI is a useful theory for understanding changes across community, as well as considering decision making processes within the individual as part of the overall change process. The next section of the chapter reviews some key decision making theories and models.

2.10 THEORIES AND MODELS OF FARMERS’ DECISION MAKING

This section of the chapter provides an overview of theories and models of farmer behaviour and decision-making, especially in rural settings. Decision-making is a process of choosing the most effective course of action from among several alternatives (Feder et al., 1985). Farmers’ decision-making may be influenced by a range of factors, but how these factors are involved in shaping the farmer’s decision to adopt innovations or choose livelihood activities seems to vary as individual farmers show unique behaviour or patterns of choices based on their own intrinsic or extrinsic needs (Maslow, 1970). This makes it difficult to fully understand farmers’ decision-making patterns.

To understand farmers’ actual decisions, it is important to explore how farmers’ simple rules of thumb give rise to a particular decision or behaviour (Ajzen, 1991, 2002a). Ajzen’s (1991) Theory of Planned Behaviour (TPB) has provided a useful framework for explaining the relationships between farmers’ decision variables and behaviour. The TPB may help elicit the farmers’ rules of thumb, which often determine the final decision but are latent in nature. Using this model, farmers’ decision rules can be distinguished according to their perceptions and attitudes, to their belief that they have the power to deal with problems and opportunities, and to the extent of socio-cultural influences. In 1970, Maslow developed ‘Need Theory’ claiming that motivation is developmental and one always chooses things based on both intrinsic and extrinsic motivations. In 1999, Glasser developed ‘Choice Theory’ that describes human behaviour based on basic human needs (survival, love/belonging, power, freedom, and fun). Both theories are merged to form Motivational Need and Choice Theory (Glasser, 1999; Maslow, 1970). Nevertheless, in this section of the Chapter, six (6) relevant decision models are briefly reviewed.
The concept of the decision-making models may be applied as a guide in the approach of identifying the choices of smallholder farmers' livelihood activities by farmers in PNG.

2.10.1 Decision Models

There are various models of farmer behaviour and decision-making in developing countries. These models are in the domain of overall farmer behaviour and decision-making with respect to technology adoption and diffusion decisions. The models include:

(i) Subjective expected utility theory (SEU) (Savage, 1954)
(ii) Diffusion of Innovation models (DOI) (theory of reasoned action) (Rogers, 1962)
(iii) Theory of planned behaviour (TPB) (Ajzen 1991)
(iv) Ethnographic decision tree modelling (EDTM) (Gladwin, 1989)
(v) Personal construct theory (PCT) (Kelly, 1955)
(vi) Motivation need and choice theory (MCT) (Glasser, 1999; Maslow, 1970)

With the exception of the DOI theory (theory of reasoned action), these models have been reviewed by Ilbery (1978), Barlett (1980a), Gladwin (1980), Jangu (1997) and Sambodo (2007), Maslow (1970), and Glasser (1999). What follows below is an overview of the basic principles of the above decision-making models. It is not the intent of this research to become too concerned with psychological models of decision making; rather the focus seeks to explore the principles of them in relation to innovation adoption and farmer decision making.

2.10.2 Subjective Expected Utility (SEU)

Subjective expected utility (SEU) model (Savage, 1954) provides the conceptual and mathematical framework that is most often used to analyse decisions under uncertainty (Edi Karni, 2014). It is based on three assumptions:

i) that decision making is (or ought to be) a process involving the evaluation of possible outcomes associated with alternative courses of action and the assessment of their likelihoods;

ii) that the evaluation of outcomes and the assessment of their likelihoods are (or ought to be) quantifiable, by utilities and subjective probabilities, respectively, the former representing the decision maker’s experiences, the latter his/her beliefs; and
iii) that the basis of the decision-making process can be judged from observed (or prescribed) patterns of choice and are (or should be) integrated to produce a criterion of choice (Edi Karni, 2014).

In other words, when confronted with a situation, the decision-maker decides the best probable alternative and at the same time decides to bear with the consequences of the action taken. Moreover, the model may perhaps be used to enlighten the decision-makers on how to strategise their cognitive dimension so as to make decisions that achieve their objectives (Edi Karni, 2014).

2.10.3 Diffusion of Innovations (DOI) models

Diffusion of Innovations (DOI) Model as described earlier in Section 2.3 was developed by E.M. Rogers (Rogers, 2003). The innovation decision process is the process through which a farmer or other decision making units acquire knowledge of the innovation, develop an interest towards the innovation, form a decision to adopt or reject, decide to implement the innovation, and finally to confirm this decision (Rogers, 2003). It is a systematic process of decision making in the adoption (or rejection) of a new innovation. Other factors that affect the farmers’ decision-making in adoption (or rejection) of innovations have been discussed in Sections 2.4 and 2.7.

2.10.4 Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) was created in order to incorporate socioeconomic, socio-cultural, psychological and economic approaches in behavioural analysis (Burton, 2004). This theory considers that a person’s behaviour is affected by the variations in the person’s attitudes, social pressures (subjective norms), and perceived behavioural control (Ajzen, 1991, 2002a)(see Figure 2.4). Here, attitudes are defined as “a person’s overall evaluation of performing the behaviour in question” (Ajzen, 2002a, p. 5).
The variables reflect the person’s positive and negative judgment about the consequences caused by the behaviour. The subjective norms reflect an individual’s ‘perceived social pressure’ that may emerge in the form of the person’s “beliefs about the normative expectations of others and motivation to comply with these expectations” (Ajzen, 2002a, p. 1). The perceived behavioural control represents an individual’s belief in their own capacity to deal with an event (Burton, 2004). The relationships between behaviour and its precursors are mediated by the person’s intention. These relationships are considered to help delineate the person’s learning and mental process, the latent determinants of one’s behaviour (Ajzen, 1991, 2002a). This theory is in accord with the concept of mental process (attitudes, expectations, social norms) outlined by Antonides (1996), in which intrinsic and extrinsic factors (stimuli, e.g. socioeconomic and personal conditions) induces mental processes and, in the end, results in an action (outcome, behaviour). Thus, TPB may provide a clearer explanation of differences in how farmers behave based on their experience or factors affecting them, although it does not explain the processes involved in decision making. The next section explains the cognitive approach to decision making.

2.10.5 Ethnographic Decision Tree Models (EDTM)

The concept of Ethnographic decision tree model (EDTM) was developed by Gladwin (1989) who recommended a cognitive approach to decision making in agriculture adoption research. Gladwin defined ethnographic decision tree modelling as a “technique to elicit the decision criteria from the decision makers themselves using ethnographic fieldwork, which is then

![Figure 2.4 Theory of Planned Behaviour (TPB)](http://people.umass.edu/aizen/pdf/tpb.measurement.pdf) (October 2013)
combined in the form of a decision tree, table, flowchart or set of if-then rules” (Gladwin, 1989, p. 8).

EDTM is a cognitive based model aimed at establishing the path of decision-making based on interview. Cognition is the mental ability by which an individual is aware of and knows about his or her environment, including such processes as perceiving, reasoning, judging and problem solving (Gladwin, 1989). What underlies the model is the emphasis on the need to describe an individual’s decision making structure based on their own criteria (such as culture and beliefs).

There are three basic assumptions of the EDTM model (Jangu, 1997; Sambodo, 2007):

(i) First, individuals are experts in making decisions and they know best their situation and capacity, even though they may have limitations in accessing and processing information.

(ii) Second, decision-makers build their decisions in a hierarchical manner but do not rank the options. This is where farmers make decisions by comparing alternatives and not ranking them.

(iii) Third, individuals employ simple rules of thumb (heuristics), possibly due to their lack of skills and knowledge to deal with many choices at once and probably uncertainties imposed by an uncertain decision-making environment.

The principles and assumptions of the model are based on imperfect accessibility and availability of information. The model can be conceptualised in two stages (see Figure 2.5). The first stage is where the decision makers unconsciously limit choices by removing the choices that do not meet their criteria.

![Figure 2.5 The original EDTM development cycle proposed by Gladwin (1989)](image-url)
The remaining choices are evaluated in the second stage. The second stage is the conscious stage of decision-making. These stages may occur instantly in the decision maker’s mind and with in-depth individual or group interviews; these stages can be formally constructed. The construction involves the generalisation of individual interviews into one pattern or tree of decision-making process. The model is then tested using a set of samples, other than the ones used in the individual interviews in order to check the reliability of the model for predicting a typical decision or behaviour in the real world (Sambodo, 2007, p. 87).

2.10.6 Personal Constructs Theory (PCT)

The concept of Kelly’s (1955, p. 46) Personal Construct Theory (PCT) is that “a person’s processes are psychologically channelised by the ways in which he anticipates events”. This implies that people are constantly striving to develop their view towards themselves and their environment as they learn new things. People generally endeavour to solve everyday issues in much the same mode as scientists; that is, they observe, ask questions, formulate assumptions, derive conclusions, and forecast future events (Kelly, 1955; Salmon, 1980). According to Kelly (1955), how we see the world is subject to revision or replacement, an assumption he called ‘constructive alternativism’. He further stressed that, because people can interpret their world from different angles, observations that are valid at one time may not be the same at a later period. Kelly (1955) believed that people view their world through templates that they create and then attempt to fit over the realities of the world. He called these templates or transparent patterns ‘personal constructs’, which he believed shape behaviour. Different people may see the same phenomenon but with different perceptions, as in PCT. Such perceptions depend on certain attributes or influences that trigger the person to see and believe in the way they do. Hence, the next model elaborates more on what influences a person’s behaviour and choices made.

2.10.7 Motivation (Need) and Choice Theory (MCT)

Farmers and community members make choices based on some kind of motivation that influences them. These motivational factors can be intrinsic or extrinsic. Intrinsic motivation is triggered from internal desires and is concerned with needs and goals while extrinsic motivation is due to external factors such as cultural influences, rules and regulations, and so on (Maslow, 1970). There is much literature about models of motivation (Glasser, 1999; Herzberg, Mausner,
& Snyderman, 2010; Maslow, 1970; McClelland, 1978), and as discussed previously, Maslow’s Need Theory (1970) and Glasser’s Choice Theory (1999) were merged to form Motivation (Need) and Choice Theory (Glasser, 1999; Maslow, 1970). Farmers’ decision behaviour and the choice of livelihood engagement can be considered through the use of this combined motivation model.

Abraham Maslow (Maslow, 1970) considered that personal experiences or behaviour are stimulated by intrinsic and/or extrinsic factors in order to meet certain needs or desired goals. Maslow’s need theory describes human beings who have wants and desires which influence their behaviour. Since the needs are many, they are arranged from basic needs to self-actualisation needs. A person elevates to the next level of needs only after the lower level of needs is satisfied. The continuum of needs based on intrinsic and/or extrinsic factors would elevate the level of need from basic to social need and further to self-fulfillment needs depending on the motivation and availability of resources.

(i) Basic needs
- Physiological needs (e.g., food, water, warmth, shelter), but as these needs are adequately met, a new set of assertive motivation arises.
- Safety needs (e.g., security concerns, stability, protection), but once a person is secure and safe, new intrinsic motivation arises.

(ii) Social needs
- Love and belonging become dominant, affections, relationships.
- Esteem needs (e.g., where you feel good about yourself, recognition, status, reputation)

(iii) Self-fulfillment needs
- Self-actualisation needs (e.g., realise full potential, seek personal growth, peace)

Maslow’s hierarchy of needs is a useful framework in understanding farmers’ motivational factors and identifying the basic needs that are lacking in rural areas.

On the other hand, Choice Theory is an explanation of human behaviour developed by (Glasser, 1999). It is a theory of behaviour that evolved from system theory which is based on the premise that all our behaviour is internally motivated to satisfy physical and/or psychological needs. That means you have the control over your actions intrinsically and are not influenced by outside or extrinsic factors. Glasser (1999) proposes that we choose our behaviour in an attempt to meet one or more of the five basic human needs that are built into our genetic structure - these are:
belonging, having fun, having freedom, having power, and surviving. The individual may not be fully aware of their basic needs mentally, but such needs will indirectly motivate their choices. The strength of each need varies from person to person. For example, some are more driven by the social need to love and belong while others are more driven by the need to be powerful.

2.11 SIGNIFICANCE OF THE MODELS

2.11.1 Analysis of the Decision Models and DOI Theory

Within the decision models reviewed above, DOI, EDTM, PCT, TPB and MCT may provide a basis and procedure for analysing farmers’ adoption-decision processes. These models also appear to be complementary and, hence, it may be reasonable to combine them. The integration may overcome the shortcomings involved when using each model separately, and permit a comprehensive assessment of an individual farmer’s mental process.

Of all decision models, Rogers’ (2003) DOI theory has been widely emphasised and applied in most disciplines of adoption studies. It is of importance to apply the principles of DOI theory to better understand agricultural innovation diffusion into the social system for several reasons. Firstly, DOI theory provides a framework that helps agriculture exchange agents to understand why agricultural innovations are adopted by some individuals and not by others. Researchers and agriculture extension agents can use DOI theory to explain, predict and account for factors that increase or impede the diffusion of innovations. Secondly, the DOI theory helps the rural farming community identify qualities (for example, relative advantage, compatibility, etc.) that will make the agricultural innovations more appealing to potential adopters (Rogers, 2003). Thirdly, the DOI framework also provides a closer look at the communication channels used to spread new ideas and technologies, how much time it should take, and what the society of adopters is like (Rogers & Shoemaker, 1971). Therefore, it is imperative to have a solid understanding of how to introduce new innovations or ideas into the social system.

Although Rogers’ approach makes several contributions to the adoption process, there seem to be certain flaws that may contribute to low adoption of agricultural innovations, especially in developing countries (For example; Botha & Atkins, 2005; Kole, 2000; Nutley et al., 2002; Vanclay, 2004; Waterman, 2004; Wolfe, 1994). Rogers’s DOI model seems to be a capitalist based concept opposed to subsistence based farming like PNG farmers. However, research and extension agents in most developing countries are continuing to adapt and promote Rogers’s
DOI model of increased production ideology in their programmes with little concern for farmers’ perspectives and livelihood concerns (K Hussein, 2002; E. C. Sitapai, 2012).

The decision models provide some basis to approaching farmers and designing data collecting tools. In Chapter 4 of this study, the concept of livelihood approach (Chambers & Conway, 1992; Frank Ellis, 1998) is considered, since this approach integrates the livelihood components of the farmer with behaviour dependent variables (see Section 4.3.7) in the context of DOI, MCT, PCT and TPB based concepts that influence the farmers’ decision making in developing strategies to improve their livelihood. As well, the MCT is based on the assumption that a farmer is driven by various generic needs (physiological needs, safety, social) (Glasser, 1999; Maslow, 1970). The key factors considered to affect a farmer’s decision are livelihood assets, personal characteristics, cultural factors, enabling agencies and services providers, and vulnerability or risks (Frank Ellis, 1998; IMM, 2008b).

The next section provides a synopsis of all models and highlights the significance of DOI.

2.12 CHAPTER SUMMARY

This chapter encompassed the literature review of Rogers (2003) innovation diffusion theory and other decision making theories. Rogers identified four factors that influence adoption of an innovation: the innovation itself, the communication channels, time factors, and the nature of the society to whom it is introduced. In the innovation adoption process, the farmer makes several decisions to adopt or to reject an innovation. The chapter also probed into understanding several decision making theories (DOI, SEU, TPB, EDTM, PCT, and MCT). The concepts from these theories are helpful in understanding the rationale of certain decision-making processes and importantly, it guided this study in identifying key attributes that were presumed to affect decision-making of farmers in undertaking certain livelihood activities. Such understanding also helped in designing data collecting instruments.

Moreover, the contribution of DOI theory to the adoption process is important as some of the variables developed by Rogers influence the rate of adoption of an innovation. For instance, the extent of change agents’ promotion efforts and the nature of socio-cultural systems may have a positive influence over the adoption rate and may be relevant to PNG farmers. However, there are some limitations to the DOI theory. The Iowa corn farmers’ story and the rationale of Rogers’ DOI study, is based on the intention to increase production with high profitability. It is apparent that Rogers’s adoption diffusion concept is a capitalist based western concept opposed to
subsistence based farming practised by most developing countries. Other flaws include pro-innovation bias, individual-blame bias, and source bias.

Agriculture extension agents also play an important role in persuading farmers to adopt new ideas or innovations. Therefore, the next chapter reviews general agricultural extension approaches and practices.
3 CHAPTER THREE: AGRICULTURAL EXTENSION PRACTICES

The previous chapter provided an overview of the theoretical aspects of how social change occurs and in particular the contributions of Rogers (2003) and his diffusion of innovations theory. The chapter also explored change at an individual level through consideration of the various factors that influence farmer decision making.

This chapter shifts the focus to the structural elements of how farming change can be facilitated at both societal and individual levels through agricultural extension. More specifically, it provides an overview of the different types of agricultural extension models that are used to initiate change in agricultural production systems generally and especially those relevant to farming communities in developing countries.

3.1 INTRODUCTION

Agricultural extension has been used as a mechanism for facilitating change in agricultural and rural development for several decades (Chambers, 1994). Historically, in developing countries at least, agricultural extension programmes have largely been funded from public (government) sources and delivered by government institutions (Bijleveld, Kok, & Bijker, 2015). Funds can also be provided through international support programmes, such as the manner in which Australia supports various developing countries in research, development and extension through its Australian Centre for International Agricultural research (ACIAR) program. Despite international support, however, the literature reveals that, in general terms, publicly funded agricultural extension programmes in developing countries are often characterised by an inconsistency in funding arrangements, financial constraints, structural adjustment policies, unstable use of subsidies, and instability of agricultural services (Carney, 1998; Leeuwis, 2000; River, 1996; Zijp, 1988).

Consequently, agricultural extension has been exposed to various challenges and developments due to globalisation, free agricultural markets, climate change, and food insecurity (Feder, Willett, & Zijp, 1999; World Bank, 2007).

In a rapidly changing world, food and agricultural innovation systems in developing countries are facing new and increasing challenges. Traditional extension organisations that had a primary focus on agricultural productivity have changed priorities towards sustainable development
Given the circumstances, participatory approaches, resource management, human development, capacity building, and community engagement have been focused on (Chambers, 1994; Coutts, 1994; Coutts & Roberts, 2011; World Bank, 2007).

This chapter explores some of the details behind agricultural extension as it’s conducted within developed countries such as PNG. It considers the concept of agricultural extension before describing the various approaches or paradigms supported by public and private investment.

### 3.2 EXTENSION PARADIGM AND DEVELOPMENT

Extension theories and practices have shifted over time from conventional extension to more community participation thus affecting the definition of extension. This section begins by defining the terms ‘extension’ and ‘paradigm’ and extends to review a brief history of agricultural extension development that consequently shifted and changed its paradigms from conventional extension to more facilitation and empowerment.

#### 3.2.1 Concepts and Definitions

The definition of the term ‘extension’ has evolved over time, depending on the social environment from which the writer was coming. Definitions developed in the 1960s to 1980s tended to concentrate on what extension agents could accomplish for their clients (farmers) rather than for their funding agents (Stantiall & Paine, 2000) and general emphasis of the extension system was on farm management and the overall farm system (Jones & Garforth, 1997). However, from the 1990s to 2000 the role of research and extension shifted from the concerns about the individual farmer (client) to organisational outcomes, natural resource management, and public benefits as well (Coutts & Roberts, 2011; Stantiall & Paine, 2000). Further changes included increased emphasis on innovation adoption, increasing production, and profitability (Jones & Garforth, 1997; Nagel, 1997; Rogers, 2003).

When it comes to defining the term “extension”, Van den Ban and Hawkins (1996, p. 9) stated that

> “extension involves the responsive use of communication of information to help people (farmers) form sound opinions and make good decisions”.


Röling (1988, p. 49), meanwhile, stated that,

“extension is a professional communication intervention deployed by an institution to induce change in voluntary behaviours with a presumed public or collective utility”.

Engaging stakeholders in embracing and continuing to improve extension as a mechanism for enabling change in individuals is recognised as an important challenge to communities and industry at all levels. Vanclay and Leach (2011, p. 6) subsequently defined extension as,

“the process of enabling change in individuals, communities and industries involved in primary industry sector and with natural resource management.”

Extension can be seen as providing information to assist the individual to clarify and achieve their own goals, or to achieve structural change through empowering the poor (Roling 1988, p. 37). The context of these extension definitions focuses on human resource development concepts and activities, emphasising the importance of teaching people how to learn, manage, communicate and analyse their environment thus resulting in a paradigm shift in how change agents view extension approach.

Thus, Ratcliffe (1983, p. 147) described the term paradigm as

“a world view, a way of ordering and simplifying the perceptual world’s phenomenal complexity by making certain fundamental assumptions about the nature of the universe, of the individual, and of society”.

Meanwhile, according to Chalmers (1982, p. 90), a paradigm is

“made up of the general theoretical assumptions and law, and techniques for their application that the members of a particular scientific community adopt”.

It seems that a paradigm is thus a comprehensive belief system, world view, or framework that guides research and practice in a field. Kuhn (1970, p. 206) is the first to be recognised for using the terms ‘paradigm shift’ to describe the importance of situations where changes have been made to the nature of experimental practices and methodology within a scientific discipline. The
idea of paradigm shift has later been used in non-scientific contexts to describe key changes in phenomena or how people view the world.

### 3.2.2 Extension Paradigm

We now know what paradigm is in general hence this section presents paradigm shift in the context of agricultural extension approaches. Agricultural extension has changed from problem based technology transfer to the process of enabling changes in individual farmers to all sectors of stakeholders at all levels as depicted in Figure 3.1 (Coutts & Roberts, 2011)

![Figure 3.1](image)

**Figure 3.1 Historical development of extension since the 1960s**

*Source: Coutts and Roberts (2011)*

Development of agricultural policy as it relates to agricultural research development and extension (RD&E) programmes can sometimes create a paradigm shift in agricultural extension (B. Swanson, 2009). It has been suggested that, despite the range of terms to describe different extension method and approaches, there are four general agricultural extension paradigms (Agriinfo, 2015; Hansra, Suraj, Ananth, & Chandre-Gowda, 2004; NAFES, 2005a; Ponnuswami &
Francis, 2012), namely: transfer of technology (ToT), advisory work, human resources development, and facilitation for empowerment in the context of capacity building and community engagement. As seen from the historical development of agricultural extension (see Figure 3.1) this has then been segregated into four (4) extension paradigms that were categorised based on the degree of participation and its complexity in nature (Fell, Clark, Easdown, & Mobbs, 1998). It is possible to depict some significant shift of development in the extension paradigm and practices which have moved from transfer of technology to facilitation and empowering of farmers and the communities (Coutts & Roberts, 2011).

![Figure 3.2 The four (4) paradigms of agricultural extension](image)

**Figure 3.2 The four (4) paradigms of agricultural extension**

*Source: Adapted from Fell et al. (1998) 90’s model of extension*

The shift in emphasis in extension from a technology transfer to a more facilitative participatory approach, particularly where extension is focused on communities rather than on individuals, has implications as far as institutional structures and policy changes are concerned (Duvel, 1995). There are two options derived from this paradigm: (i) where the change agent decides to convince farmers on what to do (i.e., persuasive methods) or (ii) the change agent seeks to inform and train farmers of different market opportunities, technical and management skills and strategies, and opt for the farmers to decide which option would be the best fit for them (Swanson & Rajalahti, 2010, p. 2).

The following classifications illustrate different combinations that help describe and highlight important differences between these different approaches or paradigms in organising agricultural extension and advisory services (B. Swanson, 2009).
3.2.3 Transfer of Technology (ToT)

The Transfer of Technology (ToT) approach that originated in the 1960s is based on the conviction that scientific knowledge is highest in the hierarchy of knowledge, with a strong belief in a natural spread of technological knowledge. In the 1970s, the World Bank designed the Transfer of Technology extension model as discussed in Section 3.3.2. In this model, scientists invent new technologies that are handed over to extension systems, for whom extension agents train “contact or leader farmers” who are supposed to train other colleague farmers (see Figure 3.3). Even today many agricultural extension systems are basically built on this model (Agri Cultures Network, 2015).

This is a ‘top-down’ model (see Section 3.3.1) that primarily delivers specific recommendations from research to all types of farmers. This approach generally uses persuasive and paternalistic (patronising) methods for telling farmers which varieties and production practices they should use to increase their agricultural productivity and thereby maintain national food security for both the rural and urban populations in the country. The primary goal of this extension model is to increase food production, which helps reduce food costs (Swanson & Rajalahti, 2010).

![Figure 3.3 Transfer of agricultural technology and innovations to farmers](#)

Under ToT, researchers are generally considered experts who develop technologies and innovations and the extension agent’s role is to teach and demonstrate to innovative ‘contact’ or ‘leader’ farmers how to use the new technologies. In the event that innovative farmers have adopted the new technologies, it is anticipated that other ‘follower’ farmers will copy them and the technology will diffuse to the majority of farmers over a period of time. In practice, this
assumption often proves unreasonable. As observed in some countries, in many cases, the ‘laggards’ can be envious of earlier adopters who are then victimised, rather than copied (Kerua & Glyde, 2016; Ponniah et al., 2008). Knowledge may also be considered a strong basis of power. Information as well as innovations may thus not necessarily be shared outside the rings of the circle, but rather, confined to close relatives and best friends (Ponniah et al., 2008).

The ToT approach is strongly linked to the diffusion of innovation philosophy. Diffusion of innovations theory says that technologies are communicated over time among the members of a social system, and adopted according to various characteristics of both the technology and the user (Rogers, 2003). The DOI model was focused on a standard process of technology development. Rogers’ model has been criticised (see Section 2.9) for this and for other shortcomings, such as the pro-innovation bias, blame of farmers for ‘non-adoption’ of technologies, lack of recognition of farmer innovations, and focus on the change agency/agent instead of the farmers (end users of technology)(Chambers & Ghildyal, 1985; Kole, 2000; Nutley et al., 2002; Simmonds, 1985; Waterman, 2004). Despite all these criticisms, it appears that ToT is still a commonly used extension paradigm.

3.2.4 Advisory Work (Problem Solving)

This paradigm can be seen today where government organisations or private consulting companies respond to farmers’ enquiries (problems) with technical prescriptions (problem solving). It also takes the form of projects managed by donor agencies and NGOs whose participatory approaches are to promote pre-determined packages of technology (Agriinfo, 2015). Advisory work is based on arising problems farmers face, and the extension agent becomes an agent for solving problems by assisting farmers to find specific technical and management solutions (Coutts & Roberts, 2011).

In responding to specific farmer inquiries about particular production problems, both public and private extension agents and farm input supply agencies use the term ‘advisory services’. Public extension organisations should have validated information available from research about the effectiveness of different inputs or methods in solving specific problems so that enquiring farmers receive factual and validated information. Most input supply firms use persuasive and participatory advisory techniques when recommending specific technical inputs to farmers who want to solve a particular problem and/or maintain their productivity. Although most firms use persuasive and participatory methods to sell more products and increase their profit, an
alternative private-sector model is to support out-grower schemes where export firms have field agents who both advise and supervise contract growers to ensure that specific production inputs and practices are followed (Swanson & Rajalahti, 2010).

### 3.2.5 Human Resource Development

This paradigm was popular in the earliest days of extension in Europe and North America, when universities gave training to rural people who were unable to enrol at the universities (Agriinfo, 2015). It continues today in the outreach activities of colleges and universities around the world. Top-down teaching methods are employed, but farmers are expected to make their own decisions about how to use the knowledge they acquire (NAFES, 2005b). This extension paradigm is based on educational and paternalistic methods, with adult and action learning principles (Nagel, 1997). One of the appropriate methods used in facilitating learning is the use of an adult learning approach (Kolb, 1984). Learning in study groups is a means of proactive informal education that seeks to help individuals better understand their situation (Coutts, 1994). To be able to gain insight into the learning process that takes place, adult learning theories are applied. Consequently, learning cycles and styles have been used to describe the study group learning process (Kolb, 1984).

The human resource development concept is much more general than that of technology transfer, despite both being closely interrelated. There are rapid changes in farming technology developments as well as farmer livelihoods, thus there is a demand for new skills. With the help of these skills, rural women and men "acquire a better insight into the network of problems and recognise the alternative solutions available" (Albrecht et al., 1989, p. 34). Conventionally, facilitating training on subject matter like basic literacy and numeracy skills has not been an extension activity. The limited success of literacy programmes in disadvantaged countries has drawn attention to non-formal education in which extension has an important part to play. Normally this would require a collaborative effort of various organisations of which extension is but one approach. According to Nagel (1997), human resource development may also be regarded as a genuine extension content.

### 3.2.6 Facilitation for Empowerment

This paradigm includes educational and participatory methods, for example, experiential learning, farmer-to-farmer exchanges, and a participatory approach (Agriinfo, 2015). Knowledge
is gained through interactive processes and the participants are encouraged to make their own decisions, for example approaches such as farmer field schools (FFS) or participatory approaches (PA) (Ponnuswami & Francis, 2012; Uddin, 2008). According to Coutts and Roberts (2011), in the group empowerment and facilitation paradigm, participants increase their own capacity in planning and decision making and seeking their own education and training needs based on their situation. The key aim is to build the skills of individuals through a facilitative framework.

This is about ownership and responsibility but it is also a logical understanding that it is the people in a particular situation who are best able to understand and act on issues directly concerning them (J. Coutts, Roberts, Frost, & Coutts, 2005). It is assumed that by persuading and encouraging people to work together in this way, sustainable solutions with positive outcomes may result. This is because farmers develop problem solving, planning and reflection skills which they can apply to new situations that emerge (Coutts & Roberts, 2011). It seems that a facilitative and empowerment paradigm involves high participation and requires serious understanding and consistent support because of its complexity.

It is sometimes argued that extension really capsulate all four paradigms. Some experts believe that the term should be restricted to persuasive approaches, while others believe it should only be used for educational activities (Ponnuswami & Francis, 2012). From a practical point of view, however, communication processes that conform to each of these four paradigms are being organised under the name of extension in many countries. Ideologically, all of these activities are agricultural extension (Ponnuswami & Francis, 2012).

Nevertheless, the extension paradigm changes as agricultural policy and the demand and expectations shift, and therefore extension approaches vary to suit the needs of clientele. Hence, the next section provides a synopsis of different extension approaches that are common in most developing countries including PNG.

3.3 EXTENSION APPROACHES

Different authors use different words in explaining the concept of an extension approach, the term often being synonymous with terms such as ‘systems’ or ‘models’. For example, (Rivera, 1989, p. 59) used “system”, Worth (2002, p. 474) calls it “approach”, Coutts and Roberts (2011, p. 24) and Black (2000) refer to it as “model”. Leeuwis (2004, p. 23) defined extension approach as the basic “planning philosophy” that is being adopted by an agricultural extension
organisation. This helps change agents to understand the essence, concepts and functional methods of extension undertaken to fulfil its goals, especially in the planning phase. Hagmann and Shultz (2000) explain how different guiding principles are applied in specific situations to fulfil different purposes and/or target specific development beneficiaries, whereas Bolliger, Reinhardt, and Zwollweger (1994, p. 11) see an approach as consisting of a series of procedures for planning, organising and managing the extension institution as well as for implementing practical extension work by trained staff using necessary and appropriately adapted means. The above analysis indicates that there is no one approach that best fits to reach all farmers; rather it is case specific or a combination of certain approaches.

Axinn (1988) stressed that strategies of agricultural extension are diverse, that several predominant approaches to agricultural extension programmes are used to achieve their goals, and accordingly eight (8) extension approaches were identified (Figure 3.4).

![Figure 3.4 Eight (8) agricultural extension approaches based on Axinn (1988)](image)

Although the above classification, made primarily for agriculture, is not complete and the distinctions between the types are not absolute, it provides an idea of the possibilities and opportunities that exist for the extension planner and for the policy- and decision-maker at the national level (Axinn, 1988). The eight (8) extension approaches in Figure 3.4 are further discussed as follows.
3.3.1 The General Agricultural Extension Approach

The ‘general agricultural extension approach’ was a conventional extension system practised in the 1960s based largely on the technology transfer model (linear transfer of technology-ToT) (Coutts & Roberts, 2011)(summarised in Figure 3.1). The ToT approach was popular in many developing countries. Within this approach scientists developed technologies or innovations based on research, and recommendations would be delivered to farmers by extension agents. Farmers were not involved in planning or development of the innovation. This technique of information dissemination is referred to as a “top down” approach (Coutts & Roberts, 2011).

The purpose of ToT is to help especially small-scale farmers increase their production. This approach assumes that technology and knowledge that are appropriate for local people exist but doesn’t predict anything about use or adoption. This approach lacks a two-way flow of information. It fails to adjust messages for each different locality. However farmers who seek advice, benefit, and these tend to be innovative and wealthier farmers (Axinn, 1988).

3.3.2 The Training and Visit Approach

The Training and Visit (T&V) approach emerged from the general agricultural extension approach. The T&V approach was introduced by Daniel Benor in 1967 in Turkey (Benor, 1987). In the mid-1960s the World Bank supported agricultural extension projects and the T&V approach was a driver which increased rapidly in the 1970s in Asia, and took root in Africa in the 1980s and in other developing countries including Pacific in the 1990s (World Bank, 1994). It spread rapidly around the world because it was seen as an effective means of increasing farm production and as a flexible tool at all levels of any agricultural ministry’s operation (World Bank, 1994).

The aim of the T&V is to encourage farmers to increase production of specified crops. The emphasis is on disseminating unsophisticated, low-cost improved practices, and teaching farmers to make better use of available resources (Ponniah et al., 2008). Policy and planning is controlled nationally and requires more change agents, thus is dependent on national resources. There is a rigid pattern of visits to farmers and in-service training of extension agents. Farm field days and follow-up visits are important features normally, arranged on the farms of contact farmers so fellow farmers can also benefit from information imparted. The T & V approach allows continuous feedback from farmer to extension agent and researcher (Engle & Stone, 1989). Subsequently, two-way communication is lacking and there is little flexibility.
Consequently, extension agents would meet with a small group of ‘contact’ farmers who were expected to disseminate information to the members of their respective communities and reciprocate feedback to the agents, thus creating a feedback mechanism that was absent in the prior system (ToT) (Birkhaeuser, Evenson, & Feder, 1991).

Although the T & V system has spread rapidly and been implemented in many developing countries with some success, it also has its flaws. Some qualitative evaluations have questioned the approach of T & V as being ‘top down’ and lacking a means for organising farmers to express their own demands for extension advice (e.g., Axinn, 1988; Röling, 1988). Some change agents have experienced problems in implementation of T & V, especially the poor choice of ‘contact’ farmers (Moore, 1984), poor research-extension links (Chapman, 1988), and weak linkages with farmers at the field level (Dejene, 1989). In other cases, the information content of extension messages given to ‘contact’ farmers is not disseminated to neighbouring farmers in the community (Lube, 1991). According to Feder, Murgai, and Quizon (2004b), it is too expensive and impossible to implement T & V over extensive regions in developing countries due to continued poor financial management.

3.3.3 The Participatory Approach

Over time the dynamics of farming have changed globally and experiences in agricultural extension and development have demonstrated that traditional approaches have shifted towards community engagement and sustainability (Ponniah et al., 2008). In the 1990s, development programmes worldwide recognised that local participation is the key to the sustainable transfer and long-term adoption of new technologies and approaches. Interactive participation is the approach that facilitates this kind of learning environment (Chambers, 1994; Roling & Pretty, 1997). Within a participatory learning process farmers and other development beneficiaries have real decision-making power and are part of the problem analysis and solution generation (Chambers, 1994; Roling & Pretty, 1997).

The term participation is defined as

“an active process whereby beneficiary or client groups influence the direction and execution of the development or management of a natural resource to enhance their well-being in terms of income, personal growth, self-reliance or other values” (Little, 1994, p. 347).
Chambers (1994, p. 953) describes the participatory approach as

“approaches and methods to enable local people to share, enhance and analyse their knowledge of life and conditions, to plan and to act”.

It is a process that enhances community capacity to help them to use their resources and those of external providers more effectively to improve their livelihood (Chambers, 1994).

A participatory approach is based on the principles of participation and self-development. It considers the farmers as participants rather than subjects. It is people-centred in the sense that the process of investigation is informed by, and responds to, the experiences and needs of the people involved (Brown, 1985). It is a “bottom up approach” in contrast to conventional research, which is more “top-down”. (Reason & Heron, 1986).

A participatory approach often focuses on the expressed needs of farmers' groups and its goal is to increase production and improve the quality of rural life through better use of existing resources. Within participatory approaches, farmer groups analyse the existing situation (constraints as well as resources available), identify priority problems, analyse the problems and develop action plans to address the priority problems, take ownership of implementing the action plans, and liaise with the service providers and development agents such as government to provide the necessary assistance. Communities also identify what incremental resources are needed and organise themselves to try to mobilise these resources (Axinn, 1988). In this manner extension involves farmers themselves in the process of research and development in such a way that their participation is highly interactive and empowering. This has the capacity to create changes in values, attitudes, and behaviour through the significant learning that takes place among all actors: researchers, extension practitioners, and farmers (Roling & Pretty, 1997).

Success from participatory approaches is measured through the numbers of farmers actively participating and the continuity of the programme following an extension event. Over time, different types and styles of participatory approaches have been developed to meet the needs of different disciplines, settings and objectives. For example, Participatory Action Research (PAR), Farmer Participatory Research (FPR), Participatory Technology Development (PTD), Participatory Rural Appraisal (PRA), and Farmer Field School (FFS) were all developed and implemented for the purposes of sharing information (Chambers, 1994).
3.3.4 The Educational Institution Approach

This approach uses educational institutions especially Universities which have technical knowledge and research skills to provide extension services for rural people. Planning is done by academics as they in charge of the curriculum of the educational institution. Implementation is through formal or non-formal instruction in groups or individuals through a college or university. The success of such an approach is measured by the attendance and extent of participation by farmers in activities that are being implemented. The advantage of this approach is the relationship between specialized scientists and field extension personnel (Ponniah et al., 2008).

Educational institution approaches vary from country to country (Axinn, 1988). Some developing countries, notably India (Ponniah et al., 2008) and Papua New Guinea (Halim, Kerua, Nano, Bue, & Manus, 2007) have integrated educational institutions into practical extension work. The four (4) fundamental programmes of this approach are:

i) capacity building,
ii) research,
iii) training, and
iv) technology transfer.

The students and academics of the universities are drivers of all the programmes in collaboration with other partners and stakeholders. The programmes are cost effective and sustainable as the existing facilities and resources of the universities are being utilised. The outputs of the programme are used as inputs in teaching and research of the university. Nevertheless, there are challenges in that lecturers are prone to speak too academically, and the content is often seen as impractical and not useful from a farmer’s perspective (Halim et al., 2007). With the emergence of new dimensions of research and development, as well as changes within the agricultural production sector, educational institutions are facing new challenges with regard to coordination and cooperation (Ponniah et al., 2008).

3.3.5 The Commodity Specialised Approach

According to Ponniah et al. (2008), the key characteristic of this approach is that its focus is on increased production. Extension is tailored towards a single commodity crop of interest (for example, cocoa) and the agent has many functions towards increasing production of the commodity. Trained scientific personnel equipped with adequate necessary utilities and field
scientific apparatus are employed. Innovations that are recommended must produce financial benefits for farmers, and be demonstrable on farmers’ own fields. New inputs must be accessible, a credit scheme established, and the ratio between farm-gate inputs and commodity prices must be considered. Technology tends to be distributed in a timely manner because it focuses on a narrow range of technical concerns. Personal interests of farmers, however, may be a lower priority than those of commodity production organisations. This approach does not provide advisory service to other aspects of farming in the case of farmers who produce more than one commodity (Ponniah et al., 2008).

3.3.6 The Project Approach

This approach uses large infusions of outside resources and is time bound (usually for a few years) to demonstrate the potential of new technologies and increases in production in a particular location. Control is at the National Government level and there are often considerable financial and technical inputs from an international development agency such as World Bank, Asian Development Bank and/or Food Agriculture Organisation (FAO) (Ponniah et al., 2008). Short-term change is the measure of success. New unique techniques and methods can be tested and experimented. In the cocoa and coffee project in Papua New Guinea, for example, a loan from the World Bank was used by the Department of Agriculture and Livestock (DAL) to support coffee and cocoa extension work by officers of both public and private agencies in many different locations throughout the country. They were able to introduce disease tolerant and high yield varieties of coffee and cocoa through an extension approach using both the project and specialised commodity approach (World Bank, 2014). One problem with this approach, however, is that ideas outside of the project are rarely considered. When the supply of money ends, so does the project. The assumption of continuity seems usually to be unwarranted. Once project termination looms, there is a running down as staff leave and the field unit struggles to become reintegrated into a larger national system (Axinn, 1988).

3.3.7 The Farming Systems Development Approach

Farming systems is a holistic approach that looks at the entire farm as a system with various subsystems. A great deal of information is gathered in order to understand the farmer’s way of life and the farming patterns, and to strengthen linkages between research, extension and farmers. This approach is measured by participation at the farm level by way of farmer input on
research and on-farm trials, and by interdisciplinary linkages and a systems approach to extension (Ponniah et al., 2008).

Norman (2002) established certain characteristics for the farming systems approach, namely:

i) a holistic approach viewing the farm as a whole,
ii) involvement of farmers and their priorities,
iii) research reflecting the various subsystems’ interactions and linkages, and
iv) reliance on informal surveys or ‘Rapid Rural Appraisal (RRA)’.

A farming systems development approach assumes that technology which fits the needs of farmers, particularly small-scale farmers, is not available and needs to be generated locally. Planning turns out to be slow and may likely be different for each agro-climatic farm system. This approach is implemented through a partnership of different research and extension agents using a systems approach. Analyses and field trials are carried out on farmers’ fields. The measure of success is the extent to which farmers adopt technologies developed by the programme and continue to use them over time. Control of the programme is shared jointly by local farm families, extension officers, and researchers.

Current information dissemination thinking takes a much more participatory, farmer-centred approach than the diffusion of innovations theory. Farmers are involved in every aspect of the diffusion process of the technology. However, it may not always been this way. The farming systems approach also emphasises strong on-farm research components where farmers, extension agents and researchers work together as a team (Axinn, 1988). Through this approach strong linkages are developed between extension and research personnel, and are farmer focused in order to help them use technologies they helped developed. However, costs can be high, and results can be slow in coming (Ponniah et al., 2008).

3.3.8 The Cost Sharing Approach

This approach is based on clientele sharing part of the cost of the extension programme. It assumes that cost-sharing with say farmers who are disadvantaged financially, will promote a programme that is more likely to meet local situations and where extension agents are more accountable to local interests. The role of the extension agent is to provide advice and information to facilitate farmers’ self-improvement. Success is often measured by the willingness to pay (Axinn, 1988). Management may be centralised but responsibilities are shared.
by various parties and are responsive to local interests. There may be issues if local farmers are pressured into investing in unproven enterprises.

The eight (8) different extension approaches discussed above provide an overview of different extension approaches with different perspectives. The next section further discusses the trends of these extension approaches.

### 3.3.9 Trends in Extension Approaches

The interpretations of the extension approaches share a number of common points. There has been a change of emphasis in various aspects of extension, such as greater interest in human factors and concern with the rural community developments. Each approach stresses that extension is a process which occurs over a period of time, and not a single, one-time activity. Each also underlines extension as an educational process which works with clients (farmers), supports them and prepares them to confront their problems more successfully.

An analysis of national extension systems in the Asia and Pacific region by Qamar (2006) shows that agricultural extension today is undergoing a major transformation as a result of dissatisfaction with public systems (Government funded) perceived to be outdated in responding to changes like globalisation, decentralisation, and the information technology revolution (e.g., internet). In some countries, agricultural extension follows a common pattern where findings from technical field research derived from controlled conditions are disseminated using 'top down' approaches with little attention to local conditions, often making the content unworkable. In other countries, despite a relatively well-organised network of extension systems, success is hampered by inappropriate material, declining budgets for field activities, and inadequately skilled and poorly motivated staff (Friederichsen, 2009).

Extension systems in many countries are struggling to shift to more farmer-oriented approaches to rural innovation that emphasise the importance of interactive, mutual learning between formal and informal knowledge systems which are integrated and multidisciplinary. It is apparent that different farmers have different priorities, understandings, values, ways of working, and different problems (Vanclay, 2004). Hence, change agents must be mindful of the above trend and apply best-fit approaches towards their clients. The next section provides a synopsis of the chapter.
3.4 CHAPTER SUMMARY

This chapter firstly described the concepts of agricultural extension, then explored the paradigms of agricultural extension before reviewing the extension approaches.

There are range of extension approaches that are practised by various extension agents depending on the type of services, their objectives, and what changes they intend to bring upon their clients (farmers). Extension comes in many categories and forms. Accordingly, eight extension approaches were examined based on Axinn’s (1988) classification (see Section 3.3). Although Axinn’s (1988) eight classifications, made primarily for agriculture, are not complete, they give an overview of the prospects and potentials that exist for the extension agencies to consider and apply according to the type of innovation, the clients, and the goals of extension programmes undertaken. Literature indicates that complexity of the farming situation and farmers’ way of life have undergone a series of changes over time and the agricultural extension discipline continues to evolve, thus affecting agricultural research development and extension (RD&E) policies and programmes creating “paradigm shifts” in agricultural extension. The four extension paradigms examined in this chapter were based on Fell et al.’s (1998) work on extension models. The level of participation determines which type of paradigm they fall into.

The next chapter reviews the smallholder agriculture and sustainable livelihood approach and framework.
CHAPTER FOUR: AGRICULTURE & THE SUSTAINABLE LIVELIHOOD APPROACH (SLA)

The previous chapter reviewed the agricultural extension practices where extension plays an important role in facilitating changes in a farming community. The literature indicated that there are many extension approaches due to changes in ideas, variations in purposes, and paradigm shifts.

The farming environment is complex and personal; each farmer’s production and lifestyle situation is unique to them and reflective of the various social, cultural and environmental values they hold important. To understand such perspectives, this chapter will explore the concept of a farmer’s livelihood and associated livelihood systems, including the extent to which a livelihood approach can be applied to identifying the key factors that affect the farmer’s decision-making.

The farmer’s livelihood is deeply associated with socio-cultural attributes. Hence, the final section of this chapter discusses the nature of the socio-cultural factors which may have an influence on a farmer’s choice of farming and other decision making in their livelihood activities and cocoa production.

4.1 INTRODUCTION

The primary focus of the chapter is to provide a conceptual framework for a Sustainable Livelihood Approach (SLA) that provides the basis of this study. After the introduction, the chapter begins by clarifying what kind of farmers this study refers to by defining smallholder farmers, then explores elements of smallholder farming so as to understand and identify some key variables important to an investigation of farmers’ livelihoods.

SLA is an investigative approach designed to improve an understanding of the way of life of rural people (IFAD, 2011). It draws on the main factors (internal and external) that affect rural people's livelihoods and the natural relationships between these factors. It is based on the concepts of capability, equity and sustainability (Chambers & Conway, 1992). This study seeks to consider SLA as a framework to help understand the main factors that affect cocoa farmers’ livelihoods, the relationships between these factors and how decisions are made concerning cocoa production. A holistic SLA is able to conceptualise the nature of the farmers’ social system...
and identify the livelihood variables or key factors determining the choices and decisions farmers make in their livelihood activities.

It is also important to explore how livelihood plays an important role in farmers’ choices and their commitment to the decisions they make, and view how the adoption of technology processes (especially the rate of adoption) is undertaken within the sustainable livelihood approach. The chapter then explores the socio cultural system and how it affects the rate of adoption (after Rogers, 2003) from a SLA perspective.

4.2 SMALLHOLDER AGRICULTURE

This section firstly defines the term livelihood and smallholder farmer, then presents the elements of smallholder agriculture, highlighting the concept of the farmer’s environment and identifying some potential factors that affect a farmer’s decision-making approach in farming and other livelihood activities.

4.2.1 Definition of Livelihood

The term ‘livelihood’ can be defined in a number of ways. A definition of livelihood from the Oxford dictionary is “a means of securing the necessities of life”.

Ireland (2004, p. 12) defines livelihood as

“the way people combine their capabilities, skills and knowledge with the assets at their disposal to create activities that will enable them to make a living”.

Yet another definition is presented by Hogger (2004, p. 35) who embraces livelihood in terms of the

“manner of life and various means of maintenance consisting of both physical and non-physical elements”.

However, the commonly accepted definition is given by Chambers and Conway (1992, p. 6):

“a livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities
and assets both now and in the future, while not undermining the natural resource base.”

Based on the given definitions, it could be said that at a general level, at least, livelihood is a way of ‘making a living’. It incorporates an individual’s resources, capabilities, income and the strategies required to secure the necessities of life for sustainable living.

4.2.2 Definition of Smallholder Farmer

The term ‘smallholder farmer’ can be defined in number of ways. No one definition clearly states what constitutes a smallholder farmer in PNG, as is the case in many developing countries. Some authors describe smallholder farmers as those who are farming less than 5 hectares of land. In PNG approximately 87 percent of the farming population are smallholder farmers (Curry et al., 2009b). With other authors, however, smallholder farm size is defined as those with less than two (2) hectares of farming land (Hazell, Poulton, Wiggins, & Dorward, 2007; IFAD, 2011; Nagayets, 2005; Wiggins, Kirsten, & Llambi, 2010). Likewise, the World Bank (2003) defines smallholders as those with a low asset base, operating less than two (2) hectares of cropping land.

The basis of a two (2) hectare definition, however, doesn’t clearly indicate the number of natural assets within the farm, or the type of crops farmed, and doesn’t acknowledge variation across countries. Similarly, the farm size-based definition does not measure production against land size (Nagayets, 2005).

Besides the farm size definition, smallholder farmers have also been described as those depending on household members for most of the labour primarily for subsistence purposes, with the aim of producing mainly for the household’s consumption (Hazell et al., 2007), while others define smallholder farms as those with limited resources including land, finance, skills, and labour. Dixon, Taniguchi, and Wattenbach (2003) define smallholders as farmers with limited resource endowments relative to other farmers in the sector.

In consideration of the above, and in view of the elements of smallholder agriculture, the characteristics used to describe smallholder agriculture include:

(a) small farms (World Bank, 2003);
(b) family-operated (Hazell et al., 2007);
There is less agreement on whether other factors should be included in the definition. The main factor behind any definition is the ability of the household to sustain its livelihood based on farming their own land.

For the purposes of this study, a smallholder farmer is defined as a farmer with less than two (2) hectares of land area, limited resources (financial), and one who depends on household members for most of their labour (Hazell et al., 2007; Lipton, 2004; World Bank, 2007).

**4.2.3 Elements of Smallholder Agriculture**

It is important to have an understanding of some of the key elements of smallholder agriculture that relate to livelihood (see Figure 4.1). The family relies on its agricultural activities to produce most of the food consumed, be it through self-consumption, cultural exchanges or selling. The family members also engage in various activities other than farming. Labour is one of the key features of smallholder agriculture. The smallholder farmers mainly depend on family labour and may require community members or distant relatives to assist and such favour is often returned (HLPE, 2013).

Resources are fundamental elements that comprise different assets or capital (human, natural, social, physical and financial), however such resources are often scarce and may affect the farmers in sustaining their livelihood (HLPE, 2013). Smallholder farmers sustain their livelihoods by developing their resources to improve and increase agricultural production to some extent. However, often, farm sizes are small due to land scarcity as a result of increase in population and excessive land usage, thus making it difficult to extend a farming area in order to earn surplus income to meet basic needs and beyond to achieve a sustainable livelihood outcome (HLPE, 2013). Nevertheless, the smallholders are not poor and nor should smallholder agriculture be seen as equivalent to poverty. A smallholder farm can be profitable for a family if the farmer invests back into the farm (HLPE, 2013) and that is often not done.

Moreover, smallholders are typically family farmers and their lives revolve around agriculture and the farming system. Often what is produced is for self-consumption and surpluses are sold for cash. Cash crops are specifically sold for money, however cash incomes are often low and
rarely do investments come back to the farm (HLPE, 2013; Omuru & E. Fleming, 2001). Smallholder farmers often depend on family labour as a form of investment. This would imply that a strong and healthy population with accessibility to basic services is important for family members’ wellbeing and to improve agricultural production (Curtis, 2013). Similarly, education and training to improve family members’ skills, both agricultural and non-farming, are also important (HLPE, 2013).

Figure 4.1 Features of a smallholder farm with dependent elements.

**Source:** Adapted from HLPE (2013)

Figure 4.1 shows the diversity, flow of income and basic needs of a household on a smallholder farm. Household income is obtained from the farm (including earnings from sales at the markets) and non-farm activities. External support provided by the government such as health, education, extension services, credit facilities, electricity, roads, and water, along with accessibility to land and other natural resources, enhance the households’ productivity thus increasing income and consequently improving the livelihoods of the household.
4.2.4 Broader Issues Affecting Smallholder Production

There are many other issues that affect a household’s decision-making in agricultural production aside from land, finance, and labour supply. These might include the farmer’s character, knowledge, beliefs, attitudes, behaviour and goals (Rogers, 2003). Furthermore, family structure, income, savings and attitude towards risk also affects farm family decisions (Shaner, Philipp, & Schmehi, 1982). The farmer’s environment includes those physical, biological, social and economic conditions under which farmers operate (National Research Council, 2010). Conditions which influence farmers’ decisions include institutional, socioeconomic, situational and management, socio-cultural, and personal factors (Ohlmer et al., 1998; Pomp, 1994; Sambodo, 2007; Shaner et al., 1982).

External factors include government relations, information channels, support services and infrastructure (Shaner et al., 1982). Socioeconomic factors include the availability of credit, marketing potential, prices of farm products, cost of hired labour, seed, equipment and chemicals, and land ownership. Situational and management factors include farming practices, land use customs and cultural practices, cropping systems and family labour. Social-cultural factors include customs, religion, and social institutions such as corporate clan groups, social cliques, reference groups and formal groups.

According to Shaner, Philipp et al. (1982) socio-cultural factors are those that community and culture exert on farmers’ decisions and choices on life. People live together as members of social groups and must conform to the role expectations of the family. This helps maintain a position of esteem within the family and respect within society as a whole. Personal factors such as age and years of schooling may influence a person’s decision to adopt a new idea (Pattanayak, Mercer, Sills, & Yang, 2003).

All of these attributes can be accommodated into the sustainable livelihood approach framework (SLF) for ease of understanding and for planning purposes.

4.3 CONCEPTS OF SUSTAINABLE LIVELIHOODS APPROACH (SLA) AND ITS FRAMEWORK

The concept of sustainable livelihood forms the basis of different livelihood approaches (SLA). Several authors (for example, Chambers & Conway, 1992; Ellis, 1999; Hogger, 2004; Ireland et al., 2004 etc.) described the livelihood approach as a pathway for poverty eradication and
proposed a composite definition of a sustainable rural livelihood, which is applied most commonly at the household level. A livelihood is ‘sustainable’ when it empowers individuals to adapt to, and recuperate from, shocks and perturbations, and to improve their well-being and that of future generations without undermining the resources on which it draws for existence (Krantz, 2001).

Moreover, fundamental to livelihood approaches are a set of principles that underpin best practice in any development interventions. This means that SLA should be people-centred, responsive and participatory, multi-level, conducted in partnership, sustainable, and dynamic in nature (DFID, 1999). These principles provide schools of thought for consideration when investigating the phenomenon of the livelihood system. However, such an approach requires a clear framework to identify elements that constitute the livelihood of people (farmers).

Supporting this principle, IMM (2008b) suggested that any livelihood study should use a conceptual livelihood framework (e.g., Figure 4.2) to aid, identify and analyse the factors affecting peoples’ livelihoods. There are many known sustainable livelihood frameworks (for example, described by; Chambers & Conway, 1992; DFID, 1999; Ellis, 1993; Krantz, 2001; Scoones, 1998, etc.) however, the fundamentals of the livelihood framework of the IMM (2008b) (Figure 4.2) was considered appropriate for this study.

Thus an SLA conceptual framework needs to consider:

(i) the priorities that people define as their desired livelihood outcomes,
(ii) their access to social, human, physical, financial and natural capital or assets, and their ability to put these to productive use,
(iii) the different strategies they adopt and how they use their assets in pursuit of their priorities,
(iv) the policies, institutions and processes that shape their access to assets and opportunities, and
(v) the context in which they live, and factors affecting vulnerability to shocks and stresses.
According to the literature, the SLA provides a useful, logical framework for thinking through the complex issues influencing the lives of mostly rural communities. It is a pathway in which policies, organisations and decision making processes influence access and ownership of resources, and a way to determine appropriate livelihood options available to rural households. The SLA provides a better understanding of the livelihoods of rural people. It outlines the main factors that affect people's livelihoods and the necessary relationships between these factors. It
can be a tool used in planning rural development activities and also in evaluating existing activities (DFID, 1999).

The central focus of the SLA as illustrated in the framework (Figure 4.2) is on people and their livelihood. The SLA framework helps researchers and stakeholders to view the community with a different mindset and to engage in structured and meaningful discussion in developing a deeper understanding of multiple factors that affect livelihoods, their relative importance and the way in which they interact. Consequently, this should help in the intervention of further developments in support of livelihoods (DFID, 1999).

The livelihood framework (Figure 4.2) not only provides a checklist of important issues and linkages but also integrates the livelihood framework with behaviour-dependent variables that influence the households (farmers) to make decisions to develop strategies to improve their livelihood. The basis of decisions made within the framework is the focus of this study.

The different elements that contribute to the ability of a person to achieve specific livelihood outcomes is also illustrated (Figure 4.2). Starting with the individual person in the centre, the framework recognises that there are certain personal characteristics which are largely unchangeable, that have a profound influence on the opportunities that a person has access to. The individual is also affected by their access to livelihood assets, which come in the form of different types of capital (e.g. natural, social, financial and so on) (IMM, 2008b).

A further tier of factors that influence people’s choices are those that determine and affect what assets a person has access to, in addition to defining how the broader society responds to their personal characteristics. Enabling agencies, such as government authorities and service providers, form another layer of influence and opportunity, as determined by the strength and quality of the relationships that the individual has with these enabling agencies, as well as the relationships these agencies have with each other (IMM, 2008b).

Beyond this are surrounding factors that can be modified or influenced to some extent. There are also factors that an individual does not have any control over generally but that can have significant implications on their livelihood activities. These include external factors that can create uncertainty, such as natural disasters, government policies, global trends and seasonal changes (IMM, 2008b). In response to all of these factors, a person will make choices that are influenced by their hopes and aspirations, as well as the shifting opportunities or threats that
the individual is exposed to. These choices lead to physical actions and activities, ultimately resulting in livelihood outcomes. These outcomes may change the nature of the underlying livelihoods’ assets (e.g. increased income will result in more financial assets), thus feeding back into the chain of influencing factors and ultimately resulting in changes in future livelihood outcomes (Cattermoul, Townsley, & Campbell, 2008). The next two sections describe livelihood activities or strategies respectively.

4.3.1 Livelihood Strategies

Livelihood strategies refer to the extent and combination of activities and decisions that individuals make in order to attain their livelihood outcomes or needs (DFID, 1999; Roche, 2007). According to FAO (2013), livelihood strategies include various income generating activities, how assets are utilised, which assets they choose to invest in, and how they manage to conserve the existing assets and income. Individuals may rely on a range of different income generating activities at the same time, and are likely to achieve a variety of goals.

4.3.2 Livelihood Diversification

Rural people no longer remain confined to crop production, fishing, hunting or livestock but combine a range of occupations to construct a diverse portfolio of activities (Frank Ellis, 1998; K Hussein, 2002; Khatun, 2010). In fact, such livelihood diversification is a process by which rural households construct a diverse portfolio of activities and social support capabilities in their struggle for survival and improvement in their standards of living (Ellis, 2000b).

Livelihood diversification can take place through both agricultural diversification (i.e., mixed farming) and non-agricultural livelihood diversification (i.e., undertaking small enterprises, making handcrafts), or choosing off-agricultural sources of livelihood such as casual labour. Traditionally, it has often been assumed that an increase in farm output would create adequate non-farm income earning opportunities in the rural economy through better linkage (Carney et al., 1999). However, this assumption may not be true for many disadvantaged rural families as farming alone is unable to provide a sufficient means of survival. Such families can, however, engage in other non-farming activities to supplement the earnings from farming (Ellis, 2000a).

Various writers (for example; Chambers & Conway, 1992; Ellis, 2000b; Karim Hussein & Nelson, 1999, etc.) suggest that although external trends and shocks play an important role in pushing
rural people towards a diversified livelihood strategy, diversification choices are also rooted in other internal or situational factors of farming households (FAO, 2013). Farmers carry out various livelihood activities with certain goals or outcomes in mind and that is discussed briefly next.

4.3.3 Livelihood Outcomes

According to DFID (1999) livelihood outcomes are an accomplishment achieved from livelihood activities and classified these livelihood outcomes as;

(i) higher income,
(ii) increased standard of living,
(iii) reduced vulnerability,
(iv) improved food security,
(v) more sustainable use of natural resource bases,
(vi) improved social relations and status, and
(vii) dignity and self-respect.

SLA concept can be orchestrated in a framework to clearly visualise the key components/factors of a livelihood system that can be studied as in this study. To describe and understand the SLA concept, it is also worthwhile considering the rationale behind its use.

4.3.4 Rationale behind the Use of SLA

The SLA provides a method of studying multiple and interactive influences of livelihoods by incorporating many attributes that are often not included in agricultural adoption of innovation studies. Major emphasis on programmes for improving agricultural research, extension services and infrastructures for the adoption of new technology is overwhelmingly placed on enhancing agricultural productivity and output (Botha & Atkins, 2005; OECD, 2000; Rogers, 2003). Researchers and extension agents have devoted much attention to the antecedents of adoption based on the perception that the farmer needs the particular innovation and that its adoption will bring about positive changes. However, it is increasingly recognised that the technology must be geared to the largest base of farmers in terms of their needs, resources and capabilities, and to the ecological conditions of local farming systems (Dethier & Effenberger, 2012). In order
to analyse farmers’ needs, resources, capabilities and their environment, the concept of SLA and its framework can be utilised.

In PNG there appears to be little or no evidence of work done that considers the livelihood of the farmer and how farmers make decisions based on their expectations in relation to agricultural production and their livelihood, and in particular with cocoa. PNG smallholder production is embedded in cultural systems (G., Koczberski, Omuru, & Nailina, 2007). However, little work has been done to recognise smallholder production as part of a social system and to understand the nature of the social system in which the potential adopters (smallholders) are embedded, its norms, and the degree of interconnectedness. Therefore, it is appropriate to utilise SLA and its framework to study the farmers’ environment in a bid to enhance our understanding of the socio-cultural system and how it affects farmers’ decision making in sustaining their livelihood particularly in cocoa production. A modified livelihood framework has been developed for the purposes of this study (see Section 6.4.3). The next section embraces the socio-cultural system through SLA and its association with Rogers’ (2003) adoption rate theory.

**4.3.5 Socio-cultural System and Adoption of Innovations through SLA Model**

There is no clear evidence of work that has employed the concept of sustainable livelihood frameworks to study the way of life of cocoa farmers in PNG in the context of the choices and decision making involving cocoa production and adoption of cocoa technologies. Hence, the present study considers part of Rogers’s (2003) determinant variables of adoption and conceptualises them in the context of an agricultural livelihood framework that embraces the notion of the socio-cultural system as a key factor affecting farmers’ decision making and adoption of cocoa innovations. The use of a sustainable livelihood approach and its framework helps us to understand the social-cultural system and main factors that affect the cocoa farmers’ livelihoods, and how decisions are made to help address some of the problems in cocoa production.

**4.3.6 Socio-cultural System**

According to Kauffman (1980), the term ‘socio-cultural system’ embraces three concepts: society, culture and system. A society is a number of interdependent organisms of the same species (people). A culture is the social behaviours that are shared by the members of a society,
together with the physical attributes. The words ‘society’ and ‘culture’ are fused together to form the word ‘socio-cultural’. A system is ‘a set of principles according to which something is done and which interact with each other to function as a whole’ (Kauffman, 1980).

In the context of innovation adoption, agricultural production does not depend only on the type of innovation itself and the method of delivery, but also on socio-cultural factors that play a vital role in the diffusion and adoption of innovations (Deligiannaki & Ali, 2011). Thus, cultural factors such as beliefs, norms, customs and uncertainty, should be considered in order to enhance the efforts and extend agricultural development (including the dissemination of agricultural technology), especially to rural farmers (Tolba & Mourad, 2013). According to Hutto, Trewhitt, and Briscoe (2011), the adoption of new technology depends on many factors such as the type of technology, the context or culture in which the technology is introduced, and the individual decisions by people within that culture.

Resistance to innovations, fuelled by fear, lack of knowledge, religious and cultural beliefs and traditional practices, has often been strong and thus knowledge and information may often be assimilated slowly (Naimi & Mark, 2010). According to Herbig and Dunphy (1998), cultural conditions determine the way in which innovations are adopted. This indicates that cultures which encourage creativity, technological ability and higher education, are more successful at adopting innovations (i.e. in the Western Society). People are influenced by others in their societies or communities when considering the use of new technologies and this also shapes their attitude towards the adoption of new systems (Al-Somali, Gholami, & B, 2009; Du, Whinston, Lu, & Liu, 2010).

In order to understand the impact of culture upon farmers’ livelihoods, cocoa production and diffusion of cocoa technology, it is necessary to realise that the livelihood activities and diffusion of an innovation never operate in isolation, but within the boundaries of a social system (Dubois, 1972). Thus, the type of innovation being considered depends on the precise nature of the social system in which it is to be adopted (Dubois, 1972). Although many diffusion of innovation researchers (Rogers (2003); Rogers and Shoemaker(1971), Zaltman and Lin (1971)) recognise the importance of cultural influences upon the diffusion and adoption processes, very few attempts have been presented which concentrate upon an analysis of their functioning at a conceptual level (Dubois, 1972). We know that culture is a pivotal element but still have difficulties understanding how it works. The literature suggests that researchers and extension agents have previously been more interested in the role of innovations as elements of cultural
change than in the impact of culture on the diffusion and adoption processes (Feder & Umali, 1993). In other words, the mainstream of interest has concerned the influence of innovation on culture rather than the influence of culture upon innovation (Dubois, 1972).

In the context of rural communities of PNG where cocoa is grown, factors like; verbal communication (not written), social stigma, and peer pressure from other community members, may influence on the diffusion innovation process. Therefore, the use of the agricultural based sustainable livelihood framework (ASLF) may be an appropriate method or tool to understand how both internal and external factors. There are various factors that influence what the farmer does and these can be investigated and analysed if we are aware of the cultural dynamics of the farming community we intend to service. The ASLF (Figure 6.1) presents possible factors (internal and external) that may affects farmers decision making in the choices of undertaking certain livelihood activities.

The next section provides a synopsis of the concept of smallholder agriculture and a sustainable livelihood approach with emphasis on the socio-cultural system and its effects on cocoa production and other livelihood activities.

4.3.7 Livelihood and Determinants of Adoption

The SLA was used in past studies as it has been found by several researchers to provide an appropriate structure for identifying the vulnerabilities and risks of poverty for rural households (for example, Carney, 1999; Chambers & Conway, 1992; DFID, 1999; Ellis, 1999; Hogger, 2004; Ireland et al., 2004 etc.). Additionally, a few researchers have used the approach to study the impact of agricultural innovations on farming households (Adato & Meinzen-Dick, 2002; Dinh, Cameron, & Nguyen, 2015; Kerr & Kolavalli, 1999).

Change agents’ emphases are placed mostly on the usefulness of a technology rather than understanding the farmers and their perceptions towards the technology. Nonetheless, the final decision to adopt a particular technology depends, to a great extent, on the farmers’ perceptions about the technology (Adesina & Zinnah, 1993), their livelihood (F. Ellis, 1998), their socio-cultural and economic situation, and their need for the technology (Botha & Atkins, 2005).

The underlying assumption (or hypothesis) is that understanding sociocultural dynamics of the smallholder farmers by researchers and/or extension practitioners may lead to better
interventions in enabling adoption solutions for farmers to address low productivity (see Figure 4.3). Furthermore, the livelihood variables may also determine the rate of adoption. The livelihood variables in Figure 4.3 is a new or modified set of variables added as the original variables which influence an innovation’s rate of adoption by Rogers (2003) does not include livelihood variables (see Figure 2.3). Thus, this study considers socio-cultural system in particularly the livelihood variables (assets, farmers’ personal characteristics, accessibility of service providers, and risk/vulnerability) that may also affect the rate of adoption in context of cocoa innovations in PNG.

According to Vanclay (2004), adoption is a socio-cultural process, where profit is not the main driving force of farmers. The socio-cultural system livelihood variables (Figure 4.3) may be the basis to conceptualise and to understand the farmers’ way of life as well as to determine the factors that affect farmers’ decision-making in livelihood activities including cocoa production.

![Diagram of Variables Determining Rate of Adoption and Livelihood Variables Determining Rate of Adoption](image)

**Figure 4.3 Socio-cultural system and livelihood variables and innovation rate of adoption**

Source: Adapted from Rogers 2003, pg 207

Rogers (2003) identified five variables determining the rate of adoption (see Figure 2.3). This study however explores one of the five variables in particular the socio-cultural system by including the livelihood variables as illustrated in Figure 4.3. The uncovering of the socio-cultural
variables that apply to the decision-making of smallholders cocoa farmers in PNG is a core task of this investigation. The next section provides a synopsis of the chapter.

4.4 CHAPTER SUMMARY

This chapter firstly defined smallholder agriculture and later reviewed the concept of the sustainable livelihood approach (SLA). Apparently the concept (as illustrated and described in Figure 6.1) could be integrated into a framework to identify key issues or variables that can easily be investigated in this study. The framework identifies key assets and elements, including the socio-cultural system, that affect the farmer and household members in decision making, especially in uptake farming or non-farming activities that enhance family members’ wellbeing. The SLA framework may explain the behaviour of the farmer but as yet it is not fully understood how the farmers react to (i) the influence of the socio-cultural system, (ii) the livelihood variables, and (iii) the outcomes or consequences of these influences. Given such limitations, the framework needs modification to suit an agricultural based approach, not only to understand the farmers’ livelihood expectations but also to determine how and why certain decisions are made in relation to their choice of livelihood strategies and up-taking of certain innovations.

The Rogers’ (2003) determinant variable which influences the rate of adoption of innovations was adapted and blended into the SLA and its framework, but with a stronger focus on socio-cultural system attributes. This is further deliberated in the modified SLA developed in this study (see Figure 6.1). The smallholder farmers in PNG are subsistence-based and highly conditioned by socio-cultural traditions, beliefs, norms, and the basic need to survive within their settings. Hence, the literature reviewed in this chapter indicates that socio-cultural influences are critical elements that could shape the farmers’ livelihood and the manner in which they deal with innovations.

The next chapter describes the PNG Government’s investment in cocoa production in the context of research, development and extension (RD&E) and challenges.
5 CHAPTER FIVE: GOVERNMENT INVESTMENT IN COCOA DEVELOPMENT IN PNG

5.1 INTRODUCTION
The previous chapter reviewed the concept of the sustainable livelihood approach (SLA) and socio-cultural factors affecting livelihood choices. The SLA explains to some extent the behaviour of the farmer but as yet it is not fully understood how the farmers react to the socio-cultural system, the livelihood variables, and the outcomes or consequences of these influences. This study also recognises the socio-cultural factors as important to farmers’ choices in undertaking various livelihood activities. Furthermore the SLA contributes significantly to the methodology of this study and it is a suitable approach to understanding the range of factors affecting cocoa farmers.

The main task of this chapter is to review the Government investment in cocoa development in order to develop an understanding of, and insight into, the cocoa industry, the developments and opportunities available, and the challenges of supporting the industry with the available research, development and extension system in PNG.

This chapter describes the major features of PNG cocoa production over recent decades and identifies the PNG Government’s commitment into cocoa production and its challenges. It begins by probing into the trends of cocoa development in PNG and explores further into the farmer, researcher and extension agent perspectives on issues affecting cocoa production. This provides a holistic view of the cocoa production environment within PNG and seeks to establish a sound basis to investigate further the institutional issues that may affect smallholder cocoa production.

5.2 PAPUA NEW GUINEA COCOA DEVELOPMENT
This section presents a brief history of cocoa developments in PNG, provides the statistics of cocoa production from the last two decades, and explores the trend of cocoa markets in PNG.

5.2.1 History of Cocoa in Papua New Guinea
German traders introduced cocoa to PNG around 1900. Development of the industry was slow in the early years, and by 1940 annual exports had reached only 200 tonnes (PNGETCS, 1987).
The Australian colonial administration promoted the rapid expansion of the industry in the 1950s, mostly through the plantation sector. In the late 1960s local farmers were encouraged to grow cocoa and to date most cocoa is grown by smallholders. The general production level, mainly from plantations, grew rapidly from the 1950s to the mid-1970s due to proper management and increases in cocoa prices (PNGETCS, 1987). Plantation production fell rapidly following national independence in the late 1970s due mainly to the neglect of plantations (when foreigner investors left), an extended period of depressed world cocoa prices and an escalation in land tenure disputes (Connell, 1997). Smallholder cocoa plantings continued to expand, and currently smallholders contribute approximately 80 percent of national cocoa production (Daniel & Guest, 2011). The next sub-section presents the cocoa production trend in PNG.

5.2.2 Cocoa Production in Papua New Guinea

Papua New Guinea (PNG) is now ranked ninth in world cocoa production with 36,000 tonnes produced in 2015/16 (Cocoa Board of PNG, 2016).

![Production/Thousand Tonnes](chart.png)

**Figure 5.1 PNG Cocoa Production 2001 - 2016**

*Source: Cocoa Board of PNG (2016)*

Annual production has fluctuated (24,000 to 53,000 tons/yr) over recent years as indicated in Figure 5.1. Various factors have contributed to the fluctuations in production levels, including pests and diseases, and a decline in the world market price, yet overall the annual production
has remained about the same. The PNG cocoa industry has both domestic and export markets and these are discussed in the next two sub-sections.

5.3 PAPUA NEW GUINEA COCOA MARKET

5.3.1 Domestic Cocoa Market

The marketing of cocoa beans begins at the farm level. There are two levels in the domestic cocoa market. The first level is the wet bean market where smallholder farmers who do not have a cocoa fermentary sell wet beans to wet bean buyers who are registered with the PNG Cocoa Board. Most smallholders participate in this market. According to CCI (2009), in the 2007/08 cocoa year there were 66 wet bean dealers, most of them based in East New Britain Province (ENBP). The second level is the dry bean market, in which dry beans are sold directly to exporters or to registered dry bean buyers who then export the dry beans to off-shore processors. In the 2007/08 cocoa year, there were 41 dry bean dealers in PNG (CCI, 2009).

In recent years, there has been an increasing trend of smallholders fermenting and drying their own cocoa for sale (Papua New Guinea Cocoa and Coconut Institute, 2010). The dry bean buyers are either independent operators or they act as agents for exporters. Almost all plantations have fermentaries and sell only dried beans to exporters. Quality assessors from the PNG Cocoa Board certify that the products comply with industry standards before they are exported. Of the total exported, smallholders account for about 80 percent of total production while plantations account for the remaining 20 percent (Papua New Guinea Cocoa and Coconut Institute, 2010).

5.3.2 Export Market

The Cocoa Board of PNG issues restrictive and unrestrictive export licenses. Companies with a restrictive export licence are permitted to process cocoa (using their own fermentaries) and export from their farms or plantations only, while those with an unrestrictive export licence are allowed to buy and process cocoa purchased from mostly smallholder farmers for export. Currently there are two export companies with restricted licenses and 16 companies (e.g. NGIP AgMark Ltd, Monpi Ltd etc.) with an unrestricted export licence (Papua New Guinea Cocoa and Coconut Institute, 2010). Figure 5.2 depicts the countries that import cocoa from PNG.
Figure 5.2 Countries that PNG exports cocoa to

Source: PNG Cocoa Coconut Institute (2010)

Cocoa is the third most important cash crop after coffee and oil palm as described in Section 1.1. The main markets for PNG cocoa over the last ten years (in volume %) are headed by USA (32 percent), Singapore (23 percent), Indonesia and Malaysia at 11 percent each; the two percent of ‘others’ includes Australia, New Zealand, Netherlands, Spain and China (Papua New Guinea Cocoa and Coconut Institute, 2010). The next section presents the trend and status of cocoa research, development and extension in PNG.

5.4 COCOA RESEARCH, DEVELOPMENT AND EXTENSION IN PAPUA NEW GUINEA

General extension practices and approaches were reviewed in Chapter 3 and a review of PNG extension development and approaches is presented in Appendix 5.1. It is important to know the general background of cocoa research, development and extension (RD&E) in PNG in order to establish the trends in cocoa development from the national level to the community based level like the study sites of this research. RD&E in PNG is largely driven in a pluralistic manner with all agricultural programmes integrated. However, recently RD&E investment has more aligned with commodity specific production including cocoa, coffee, and oil palm, especially within the private sector (see Appendix 5.1). Thus this section does not present a general perspective of RD&E in all agricultural commodities but focuses on cocoa specifically and issues
affecting the cocoa industry. Extension in other commodities is basically captured in Extension Development in PNG as presented in Appendix 5.1.

5.4.1 Development of Cocoa Research

Cocoa industry specific research and development (R&D) in Papua New Guinea (PNG) began as early as 1928 when a demonstration plantation was established at Keravat in East New Britain Province (ENBP) (Antony, Kauzi, Loh, & Anderson, 1988). Table 5.1 presents cocoa research and development between 1940 and the mid-1980s at the Keravat demonstration blocks.

**Table 5.1 Cocoa research and development in PNG chronologically**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cocoa Research Programmes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940s</td>
<td>Breeding trials were done in Keravat Lowland Agricultural Experiment Station (LAES). From these trials pods were selected from promising trees, serving as a valuable source of genetic material for future cocoa breeding (Cocoa Research Group of PNG, 1983)</td>
</tr>
<tr>
<td>1950s</td>
<td>The breeding program expanded, concentrating on identifying and selecting material that was higher yielding and disease resistant. Amazonian and Amelonado material was imported from Trinidad and Malaysia, respectively, and was evaluated in the 1960s (Antony et al., 1988; Cocoa Research Group of PNG, 1983). Agronomic research into intercropping cocoa with coconuts became common after successful trials in New Ireland Province.</td>
</tr>
<tr>
<td>1960s</td>
<td>Breeding programmes continued. In the mid-1960s an outbreak of vascular-streak dieback (VSD) disease in many parts of PNG caused serious damage. By 1968, the pathogen responsible for VSD was identified and separated (Antony et al., 1988; CQIP, 1995). Post-harvest research on cocoa was mostly in the area of fermentation and drying techniques (processing). Research into cost-effective drying of fermented beans involved hot air drying of cocoa on a platform-type dryer for 20 hours, followed by an interruption of 48 hours in drying, followed by completion of drying for a further 24 hours in a rotary dryer (Cocoa Research Group of PNG, 1983; Newton, 1964, 1965). Breeding programmes continued.</td>
</tr>
<tr>
<td>1970s</td>
<td>The continuation of the cocoa hybrid breeding programme culminated with the introduction of progenies of Amazonian types from Trinidad. These progenies differed from the traditional Trinitario cultivars grown in PNG, which are natural hybrids of the Criollo and Forastero types. The selection that followed led to the establishment of a new crossing programme in which Amazonian and Trinitario parents were crossed in 21 combinations (CQIP, 1995). The resulting progenies were field planted in November 1973 and testing took place from 1975 until 1980. The problem of high acidity in cocoa beans was a concern, and research into finding ways to reduce the level of acidity began in the late 1970s (Dougan, 1979; Lock, 1982).</td>
</tr>
<tr>
<td>1980s</td>
<td>The cocoa hybrid breeding program continued and seed gardens were then established, and production and distribution of hybrid seed began in 1982. This cocoa variety became widely known as ‘seed garden 1’ (SG1) (CQIP, 1995).</td>
</tr>
</tbody>
</table>
Cocoa entomology research centred on major insect pests according to the type of damage they caused: (i) wood feeders (Pantarhytes, longicorns, coffee stem borer, pansepta and termite); (ii) pod feeders (mirids, amplypeta and pod borers); and (iii) flush feeders (caterpillars, rhyparids, mealybugs, grey weevils and Pantorhytes) (CQIP, 1995).

Ongoing agronomic research involved shade, spacing and fertiliser trials. Studies were also conducted to identify specific soils for growing cocoa, suitable shade species and pruning techniques.

5.4.2 Current Status of Cocoa Research

Generally, the present technical research focus in cocoa is strong and has a credible history. As illustrated in Figure 5.3, since 1981, cocoa research was carried out by the Cocoa Research Company Limited (CRCL) which then merged into the Cocoa Coconut Research Institute (CCRI) in 1986 and officially assumed responsibility for all cocoa and coconut research and development (R&D) in PNG. In the same year Cocoa Coconut Extension Agency (CCEA) was formed to do cocoa extension work. CCRI and CCEA then merged to form PNG Cocoa Coconut Institute (CCI) in 2003 that would enable extension and research to work more closely than the past (Tumun, 2006).

Figure 5.3 Cocoa Research and Extension Developments in PNG (1960 – Present)
Since then there has been continuous government investment in cocoa research programmes, including cocoa breeding, agronomy, entomology, and pathology. Post-harvest cocoa quality improvement research has also been given more attention, particularly on drying methods, in relation to removal of volatiles and non-volatiles to determine cocoa quality (CCI, 2009).

Most research was on an ad-hoc basis and was focused mainly on pressing issues impacting on the industry at the time. In recent years a major research effort has been tailored towards a cocoa breeding program and managing Cocoa Pod Borer (CPB) (*Conopomorpha cramerella*), a pest that has severely impacted production in the major cocoa producing provinces in PNG since 2006, particularly in East New Britain Province (ENBP) (Curry, Lummani, & Omuru, 2009a). CPB is the single largest threat to the economy and society of ENBP and other cocoa growing provinces, with social and economic impacts potentially worse than other disasters. CPB continues to threaten the agricultural families and communities by affecting smallholder cocoa farmers’ means of income, making it difficult for them to meet their needs in education and health and to maintain their general quality of life (Curry et al., 2009b).

The PNG CCI conducted various research programmes into management approaches to control CPB and the findings led to a series of Integrated Pest and Disease Management (IPDM) options for improving crop management and cocoa bean yield. (Curry et al., 2007a). Most cocoa research are not done in isolation but collaboratively.

### 5.4.3 Collaborative Research

Collaboration in cocoa related research in PNG occurs at various levels, including between individual researchers, groups, departments, institutions, sectors and countries. The rationale behind collaborations is to develop and strengthen partnerships, share resources, pool expertise for complex problems, and exchange ideas (Bukvova, 2010). In the case of PNG CCI, the current collaborations are within the institutional parameters of interest and programmes within its research mandate of cocoa and coconut, must be of the same for its collaborators. For example, selected cocoa clones from the international cocoa breeding project, in which the CCI participates with nine other countries, are being used in the cocoa breeding programme. PNG CCI have also recognised spill-over costs and benefits and these were addressed in the initial stages of project formulation (Papua New Guinea Cocoa and Coconut Institute, 2010).
Having reviewed the trends of cocoa research and development, it is also important to discuss the cocoa extension work in the country.

5.5 CURRENT STATUS OF COCOA EXTENSION

This section reviews the current cocoa extension agencies, its programmes, and issues in cocoa extension.

5.5.1 Cocoa Extension Programmes

Currently cocoa and coconut extension service delivery is the responsibility of the Industry Services Division of CCI. The coverage of the extension programmes involves thirteen cocoa and coconut growing provinces in the country. The implementation of extension programmes in the provinces is facilitated through a Memoranda of Agreement (MOA) signed between CCI and individual Provincial Governments of each province. The MOA spells out clearly the participatory roles and responsibilities of both parties, commitments for joint funding and sharing of resources, assets and staff requirements (Papua New Guinea Cocoa and Coconut Institute, 2010). Table 5.3 presents the provincial extension programmes.

Table 5.2 Cocoa extension components

<table>
<thead>
<tr>
<th>The core extension components which constitute the provincial extension programmes</th>
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<tbody>
<tr>
<td>• Cocoa pod borer (CPB) management,</td>
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<tr>
<td>• Block management utilizing integrated pest and disease management (IPDM),</td>
</tr>
<tr>
<td>• Farmer training on all cocoa and coconut technologies,</td>
</tr>
<tr>
<td>• Planting material production and distribution,</td>
</tr>
<tr>
<td>• Cocoa processing and quality aspects,</td>
</tr>
<tr>
<td>• Information dissemination (field days, publication/publicity, radio program, etc.); Research support,</td>
</tr>
<tr>
<td>• Farmer database, and</td>
</tr>
<tr>
<td>• Forging linkages with stakeholders.</td>
</tr>
</tbody>
</table>

It is through the implementation of these activities that farmer productivity, processing, marketing and technology adoption is enhanced (Papua New Guinea Cocoa and Coconut Institute, 2010).
There has been a continuous reassessment and re-focusing by CCI and its change agents in how they can work with farmers more effectively (E. C. Sitapai, 2012). Adapting and disseminating technologies to changing farmer circumstances has been challenging (Snapp, Kanyam-Phiri, Kamanga, Gilbert, & Wellard, 2002). Understanding the constraints faced by farmers with few resources could improve efforts to develop and disseminate appropriate technology. Extension through participatory research and field demonstrations has been shown to be a practical, cost effective means to involve farmers and disseminate technology (Olanya et al., 2010).

A participatory or farmer-driven extension method is currently used by CCI extension agents. Using methods such as experiential learning and farmer-farmer exchanges, researchers and their agents are discovering that knowledge is better gained through interactive processes, and wider stakeholder participation. Participatory modes of extension being used in PNG include the farmers’ field school (FFS) concept, participatory action research (PAR) and participatory technology development (PTD). FFS is being trialled by CCI to improve cocoa farm management practices in overcoming losses to cocoa pod borer. It is a group-based learning process used in several countries to promote integrated pest management (IPM) strategies. FFS brings together concepts and methods from agro-ecology, experiential education and community development (E. C. Sitapai, 2012).

The provision of extension services is not limited to CCI. There are other organisations involved in service delivery of cocoa technologies, including all three levels of government (National, Provincial and Local), statutory agencies, the private sector and some Non-Government Organisations (NGOs). Sectoral expertise is, therefore, available and supportive. There is, however, a need to properly train extension officers from these other organisations in the use of technological packages so that they can better deliver them to the farmers (Papua New Guinea Cocoa and Coconut Institute, 2010).

CCI has extension officers based in 13 of the 14 cocoa growing provinces. The Institute’s extension partner includes Department of Agriculture and Livestock (DAL) officers in most of these provinces, officers from the PNG Cocoa Board (PNGCB), and those working in a number of NGOs in PNG. Most recently, CCI has started working closely with organisations from the private sector as partners in service delivery (Papua New Guinea Cocoa and Coconut Institute, 2010).
5.6 ISSUES IN COCOA EXTENSION

Extension is carried out to be the vehicle to deliver and impart the knowledge and information about the technologies that the Institutes develop for the farmers. Extension within the PNG cocoa industry, however, is faced with various challenges.

5.6.1 Low Adoption of Cocoa Technologies

Since the establishment of Cocoa Coconut Research Limited (CCIL), new cocoa technologies have continued to be developed (See Table 5.1). However, the level of adoption of the different technologies varies quite considerably. For example, the new hybrid cocoa clones released in 2003, have not been widely adopted so far (Papua New Guinea Cocoa and Coconut Institute, 2010). Despite intensive research into developing improved cocoa technologies, uptake by farmers has generally been poor (Daniel & Guest, 2011). In assessing grower practice, Omuru et al. (2001) found that productivity improvement would be boosted by supporting farmer adoption of low to medium cost control options along with effective extension delivery services. According to the PNG Cocoa Coconut Institute (2010), one of the reasons that some of the technologies are not adopted well by the public or farming communities is the level of uncertainty that may surround them. Good public relations enable open dialogue with stakeholders and the rural communities so these types of issues have to be addressed. Once this is established, CCIL can easily promote any technologies that are needed to be disseminated.

5.6.2 Poor Extension Approaches and Services

According to a study done by Daniel, Konam et al. (2011), a large part of the problem with cocoa production has been the lack of an effective extension service and the diversity of farmer backgrounds and circumstances. One of the contributing factors is the work behaviour of extension workers who have the tendency to remain in their offices rather than actively engage with farmers. This is due to inadequate technical knowledge, funding shortages and logistical problems. The Daniel, Konam et al. study, has shown that the gap between research outcomes and the application of technology in the field can be overcome by providing on-farm training in aspects of crop (cocoa) management to extension agents and farmers, and by offering a range of management options from which farmers can choose. What matters most is continued regular follow-up training and contact with farmers by well-trained, skilled extension staff. At this stage there is still a heavy dependence on the scientific staff to provide extension services rather than extension staff (Daniel et al., 2011). PNG Cocoa Coconut Institute (2010) continues
to collaborate with the government, the private sector and NGOs in addressing some of the constraints encountered by CCI in a cost effective way.

5.6.3 Poor Investment

Lack of staffing requirements for full coverage in cocoa coconut growing regions, insufficient funds, poor infrastructure, and continued disturbance and instability in institutional governance, leads to inefficient in service delivery (Omuru, 2001b). Some of these issues cannot be addressed by CCIL alone, but by forging partnership with government at all levels, private sector and NGOs. These cocoa issues are challenging and need to be addressed in order to increase production.

5.7 CHAPTER SUMMARY

This chapter served three distinct but interrelated purposes. Firstly, the chapter described the cocoa development in Papua New Guinea (PNG). Secondly, the chapter reviewed the PNG Government’s investment in cocoa, research, extension and development, and finally, the issues in cocoa extension were acknowledged.

Given the global context of cocoa supply and demand, PNG is a key player in supplying the world cocoa market (see Figure 5.2), but is yet to meet the production requirements. It is evident that the PNG Government has invested through research, extension, and various funding projects to improve cocoa production to meet market demands through smallholder cocoa production but challenges remain. Government policy in the cocoa industry is administered and implemented at the farm level by research and extension agents. Extension agents and agencies play an important role in supporting smallholder farmers engaged in cocoa production, and facilitate their efforts to solve problems by linking to markets and other players in the cocoa value chain, and by providing information, skills, and technologies to improve their livelihoods. However, extension services have been a major constraint in PNG and cocoa production remains low. The complexity in the agricultural extension service has evolved as a result of political, administrative, and institutional reforms over several decades. An effective extension system is vital; however, what matters most is the uptake of the technology and information by farmers (end users) and practice changes.
6 CHAPTER SIX: RESEARCH DESIGN AND METHODOLOGY

The previous chapter reviewed the PNG Government’s investment in cocoa research, development and extension. The chapter explored some of the challenges of creating change in cocoa production, including consideration of some of the specific issues facing extension delivery within the cocoa industry. The focus of this research is to explore how an understanding of cocoa livelihood might address some of the cocoa production and cocoa extension challenges mentioned in the previous chapters. This chapter presents the research design and methodology for undertaking this exploration.

6.1 INTRODUCTION

This chapter firstly presents a brief literature review of social science research methodology and the rationale behind the methods used in this study. It then describes the research philosophy that introduces us to two research paradigms - positivist, and post-positivist (or interpretivism) - and the research strategy (design) and framework. Understanding the research paradigms provides a platform that paved the way for a qualitative based research with incorporation of phenomenological and inductive approaches based on the context (problem and nature) of this study. Consideration of the manner in which the research adapted the sustainable livelihood framework (SLF) is also provided. The main purpose of this methodological review was to grasp an understanding of the different approaches to qualitative research and identify which approach best fits the investigative pattern of this study. The second part of this chapter (Section 6.5) (Cohen, Lawrence, & Morrison, 2000) describes the research/data collection methods used in this study. The chapter then acknowledges the limitations of the scope of this study and concludes with a chapter summary.

6.2 DETERMINING A SUITABLE RESEARCH METHODOLOGY

This section reviews the qualitative research philosophy or theories to determine the research approach most suitable for this study. It is important to differentiate between research methodology and methods and to have a clear understanding of research philosophy and paradigms before choosing a method(s) for data collection and analysis in any social science research.
The terms ‘methodology’ and ‘method’ are distinctive concepts. Analogically, ‘ology’ means ‘study of’ so ‘methodology’ is the study of methods. Methodology alludes to the general approach taken, as well as to the theoretical perspective or worldview from how the researcher perceives it, while ‘method’ is the various tools and techniques used in collecting and analysing data (Hussey & Hussey, 1997). A ‘methodology’ refers to a model to conduct research within the context of a particular paradigm. It incorporates the underlying sets of beliefs that guide a researcher to choose one set of research methods over another. A research ‘method’ consists of a set of categorical steps, tools and techniques to collect and analyse data (Sarantakos, 2005).

A research ‘method’, for example an interview, can be used within different research methodologies. Thus, a ‘method’ is the process of doing research, whereas a ‘methodology’ is the theoretical and ideological foundation of a ‘method’. A research design is the linkage ‘methodology’ of using an appropriate set of research ‘methods’ in order to address research questions that are established to be examined (Sarantakos, 2005)

6.3 RESEARCH PARADIGMS

The term ‘paradigm’ has many applications and contexts, including within research. According to Hussey and Hussey (1997, p. 47) paradigm refers to the

“progress of scientific practice based on people’s philosophies and assumptions about the world and the nature of knowledge”.

Further, Weaver and Olson (2006) describe how research can be affected and guided by a certain paradigm by claiming that paradigms are systems of beliefs and practices that regulate inquiry within a discipline by providing a framework and processes through which an investigation is practised.

There are two main paradigms that form the basis of research in the social sciences and Hussey and Hussey (1997) discuss the two types of paradigms: positivist and post-positivist (or interpretivist) and these are described next.

6.3.1 Positivist

According to Comte, true knowledge is based on the experience of the senses and can be obtained by observation and trialling (Biographycom Editors, 2014). A positivist paradigm is
directed at explaining relationships. Positivists attempt to identify causes which influence outcomes (Creswell, 2003). Their aim is to formulate laws, thus yielding a basis for prediction and generalisation. Correlation and experimentation are used to reduce complex interactions into constituent parts. Verifiable evidence is sought via direct experience, and observation often involves empirical testing, random samples, controlled variables (independent, dependent and moderator) and control groups. Cohen et al. (2000) proposed that an approach which is characterised by procedure and methods that are designed to discover general laws is fundamental to a positivist approach.

Positivism regards human behaviour as passive, controlled and determined by the external environment (Cohen et al., 2000). Thus, people’s perceptions, emotions, feelings, choices, and so on, are not taken into account in viewing and interpreting social reality. According to the critics of this paradigm, scientific enquiry (research) should be approached subjectively rather than objectively. This critical perspective gave rise to post-positivism or interpretivism (Cohen et al., 2000).

6.3.2 Post-Positivist

Post-positivism is often regarded as a reaction to positivism, an alternative to it or an umbrella term for all the alternatives. Post-positivism or interpretivism proposes that social phenomena are viewed and interpreted by the individual according to their perceptions and experiences (Agar, 1988).

Post-positivists try to understand natural relationships using experimentation and correlation studies. However more than-database on the senses is collected; participants’ perspectives are also often sought. Furthermore, as knowledge is tentative, hypotheses are not proved (Creswell, 2009).

Knowledge and meaningful reality are constructed in and out of interaction between humans and their world, and are developed and transmitted in a social context (Crotty, 1989). Thus, the social phenomenon can only be understood from the viewpoint of individuals who are participating in it (Cohen et al., 2000). Post-positivism aims to bring into consciousness hidden social forces and structures. The post-positivist approach is directed at understanding phenomenon from an individual’s perspective, examining connections among people as well as the verifiable and social settings that individuals possess (Creswell, 2009). As summarised in
Table 6.1, examples of approaches include: *phenomenology* (the study of direct experience without allowing the interference of existing preconceptions), *ground theory* (build a theory based on some common practices), *ethnography* (the study of cultural groups over a prolonged period), and *case studies* (in-depth study of events or processes over a prolonged period).

Table 6.1 Common types of post-positivist (qualitative) research

<table>
<thead>
<tr>
<th>Type</th>
<th>Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenomenology</td>
<td>is connected with the essence or basic structure of a phenomenon</td>
<td>A Phenomenological Case for the Family Farmer as an Environmental Steward (Hanson, 2001)</td>
</tr>
<tr>
<td></td>
<td>Uses data that are the participant’s and the investigator’s firsthand experience of a phenomenon</td>
<td></td>
</tr>
<tr>
<td>Grounded Theory</td>
<td>Is designed to inductively build a substantive theory regarding some aspect of practice</td>
<td>Combining Research Styles of the Natural and Social Sciences in Agricultural Research (Nuijten, 2010)</td>
</tr>
<tr>
<td>Ethnography</td>
<td>Focuses on society and culture</td>
<td>Interethnic Marriages: Changing Rules and Shifting Boundaries Among the Wampar of Papua New Guinea (Beer, 2006b)</td>
</tr>
<tr>
<td></td>
<td>Uncovers and describes beliefs, values, and attitudes that structure the behaviour of a group</td>
<td></td>
</tr>
<tr>
<td>Case Study</td>
<td>Is intensive, holistic description and analysis of a single unit or bounded system</td>
<td>Funding and Managing Agricultural Research in a Developing Country: A Papua New Guinea Case Study (Omuru &amp; Kingwell, 2006)</td>
</tr>
<tr>
<td></td>
<td>Can be combined with any of the above types</td>
<td></td>
</tr>
</tbody>
</table>

6.3.3 Phenomenology

Generally, 'phenomenology' refers to a person's viewpoint of the meaning of an event that occurs extrinsically and is not something within the person. Phenomena may be occasions, circumstances, experiences or ideas. A phenomenological research study is a study that attempts to understand people's perceptions, perspectives and understandings of a particular situation (or phenomenon) (Van Manen, 1990).

Society is encompassed by numerous phenomena, which people may be mindful of yet not completely understand. An individual's lack of understanding of these phenomena may exist because the phenomenon has not been openly described and explained, or an understanding of the impact it makes may be unclear. For example, it is a common understanding that most of the rural population are farmers, but what does farming actually mean and what is it like to be
a farmer? Phenomenological investigation begins with the assertion that there is a gap in the understanding and that improvement will be of advantage. Phenomenological research will not necessarily provide definitive explanations, however, it brings issues to light and expands understanding (Merleau-Ponty, 1999).

The descriptive study of how individuals experience a phenomenon is an important undertaking of qualitative research. A fundamental question in phenomenology could be: what is the rationale, structure, and essence of the experience of this phenomenon by an individual or by numerous people within a society? Within this approach, the researcher tries to gain access to people’s ways of viewing the world, including their wealth of experience. For example, what are the essences of people’s experiences of lack of agricultural extension services to their community? Conducting in-depth interviews or utilising principles of language (vocal, body, sign) and interpretive research approaches are common methods of gaining access to individuals’ experiences (Goulding, 2005). Through language, humans express the meaning of their experiences. Therefore, the words of those who experience a phenomenon may become the primary data for analysis of that experience (Creswell, 2003).

Phenomenology is therefore an inductive, descriptive research method, which seeks to gain understanding of human consciousness and experience (Merleau-Ponty, 1999). It is inductive in nature because the researcher does not consider causal explanations, or endeavour to validate predetermined hypothesis or theoretical concepts. It is the study of essences, where all problems amount to finding definitions of essences, their perceptions, or essences of consciousness (Merleau-Ponty, 1999). Therefore, the words of those who experience a phenomenon may become the primary data for analysis of that experience. (Creswell, 2003).

6.3.4 Grounded Theory

According to Creswell (2009, p. 229) grounded theory is

“a qualitative strategy of enquiry in which the researcher derives a general abstract theory, action, interaction, grounded in the views of participants in a study”.

This process involves multiple stages of data collection and the refinement and interrelationships of categorises of information (Charmaz, 2006; Strauss & Corbin, 1990). Glaser and Strauss (1967) classify Grounded Theory as an interpretive qualitative research approach.
Grounded theory aims to generate theory from data. It is particularly useful in situations where little previous research has been undertaken. Grounded theory begins with a general area of interest and allows participants to describe those issues they find important, rather than trying to discover differences between groups (Charmaz, 2008c).

Creswell (2009, p. 13) described the two primary characteristics of grounded theory research design as:

1. The constant comparison of the data with emerging categories, and
2. Theoretical sampling of different groups to maximise the similarities and differences of information

These two recognized principles of grounded theory render it a suitable approach for examining social phenomena, especially when there is a possibility that there has been minimal thought or understanding about the circumstances under scrutiny (Creswell, 2009; Glaser, 2001; Glaser & Strauss, 1967).

### 6.3.5 Ethnography

According to Jones, Kriflik, and Zanko (2005), ethnography is the study of culture, where people share similar patterns of beliefs and behaviour. Thus, it is seen as the science of cultural study, where a group is examined with the purpose of understanding them (the group) from a local perspective. Ethnographic research is where the researcher attempts to locate a connection between what is observed and the way things work or are said to work. Observations are analysed and interpreted, either within the social group of study or from the perspective of the observer (Goulding, 2005).

In an ethnographic approach, according to Rosen (1991), it is imperative that the researcher focuses on one or a combination of three fundamental constructs:

a) *functionalism* – setting up the appropriateness of the reported information to those of human needs,

b) *structural-functionalism* – fortifying social and cultural balance with the observed information; and,

c) *structuralism* – highlighting the information's concordance with assumed meta-examples of thought.

The information or data is compiled from the researcher’s observations, experiences, interviews, and field notes which are compared against the researcher’s own beliefs,
understandings, and visualisation, and as time and information accumulate these interpretations are continually rethought and modified (Rosen, 1991).

Research findings as such cannot be generalised but are often connected by time, place or circumstance. Any ethnography studies are labour intensive and always involve prolonged direct contact with group members in an effort to look for grounding but holistic explanations, according to Goulding (2005). Hence, the researcher has to become acclimatised to the field, which also adds time to the investigation.

6.3.6 Case Study

A case study is

“an empirical enquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used” (Yin, 1989, p. 13).

The case study approach can reveal a situation of special interest to the researcher that conceptualises various elements that are able to be articulated into specific interests. It allows the researcher an opportunity to explore the causal links in real-life interventions that would be too complex for surveys or experimental strategies (Yin, 1989). A case study allows for an opportunity to conduct a single specific study on particular issues or concerns, or a number of case studies on these same issues in different circumstances can be conducted for comparative purposes (Creswell, 2009). The choice of selecting singular or multiple case study analysis will depend on the research questions being addressed. The case study method is often appropriate when there is a desire to find a general understanding, rather than specific findings (Yin, 1993).

Case studies provide rich and deep description with little basis for generalisation. By contrast, Grounded Theory enables the researcher to investigate phenomena in both great and narrow depth, and while the report is augmented through contextual excerpts, it does not rely upon deep description (Glaser, 2001).

The four types of post-positivist research design approaches reviewed above do not form an exhaustive list and some research methods can be applied with either a qualitative or a quantitative orientation. The type of methodology employed depends on the research
questions, the people or situations being studied, and the way the data is analysed, interpreted and presented. Having to understand the research paradigms thus provides the researcher with a better understanding in determining a suitable research design and method for their study.

6.4 RESEARCH DESIGN AND FRAMEWORK

The purpose of a research design is to ensure that the data acquired provides findings aligned to the intent or direction of investigation as precisely as possible. Collecting relevant data provides details of the type of data needed to answer the research question or to test a theory (Yin, 1989). When designing research, one needs to consider what type of data is needed to answer the research question in an appropriate way. Imperatively in qualitative research, the type of data to be collected determines what sampling and data collecting methods (e.g. case study, interviewing, key informant questions, etc.) need to be designed. Thus, it is important to identify the research design attributes at the start of the research, in order to draw solid conclusions and answer the research questions.

This section of the chapter firstly presents the rationale for undertaking a qualitative investigation, then reflects on the intent of a phenomenological and inductive approach. The section also presents the sustainable livelihood framework adapted in this study.

6.4.1 Rationale for Qualitative Study

Qualitative research tends to develop explanations of social phenomena (Hancock, 2002). In other words, it describes the surrounding and social aspects that influence our lives and development, and that are constantly evolving as we proceed through life. It seeks to help us understand our environment and why things are the way they are. It focuses on the social dynamics of reality and tries to find answers to questions about:

- Why people behave the way they do.
- How opinions and attitudes are formed.
- How people are affected by the events that they are exposed to.
- Justifications of why cultures and traditions have come about in the way they have.
- The differences between societies (Hancock, 2002).

Denzin and Lincoln (2000) also stated that qualitative research is fundamentally designed to investigate people’s perceptions of how they view reality. These types of questions are the kind of queries to this study’s research questions.
6.4.2 Why a Phenomenological Approach?

After reviewing the four (4) types of positivist qualitative research design (Grounded Theory, ethnography, case study, and phenomenology), this study adapted the phenomenological approach as it attempted to capture information from farmers’ and extension agents’ experiences through descriptive analysis. It examines how people perceive a phenomenon (situation) and their reactions and experiences. For example, a cocoa farmer may experience fear for months or years after the infestation of cocoa pod borer (CPB), even when no apparent danger exists. What does this fear mean? Where does it originate from? How is it encountered? The justifications bring us closer to understanding the effects of the phenomenon on the farmer’s reaction to CPB. The researcher also learns about other people by listening to their descriptions of how they view reality, together with displaying empathy as fully as possible and remaining free of the researcher’s preconceptions and interferences.

This study engages a cross-sectional descriptive study, in the context of phenomenological reflection in which qualitative methodology is employed in data collection and analysis. The qualitative descriptive study is the method of choice when descriptions of phenomena are desired (Yin, 1989). A descriptive study seeks to provide an accurate description of observations of a phenomenon and is cross-sectional (data collected once). Many cross-sectional studies can be exploratory or descriptive in purpose. They can be designed to look at how things are now, without any sense of whether there is a history or trend at work. The research design and methods of this study outlined in the next sub-section constitute a phenomenological paradigm.

6.4.3 Adapting the Sustainable Livelihood Framework (SLF)

The sustainable livelihood framework (SLF) used in this study is adapted from IMM (2008b) (see Section 4.3, Figure 4.2). It is apparent that the sustainable livelihood approach (SLA) and its framework (see Figure 6.1) is focused on people and illustrates the possible external, surrounding, situational and personal factors that influence farmers within a society.
The SLF was developed to understand the factors associated with farmers’ environments and how those factors affect farmers’ wellbeing and their decision-making in agricultural production. The framework considers various livelihood factors such as availability and accessibility of assets (finance, natural resources, human, social, and infrastructure), service providers, risk and vulnerability, and personal factors that affect farmers’ choices in making decisions about their livelihood strategies (farming and/or non-farming activities) for sustenance and improvement of their lives.

The SLF in Figure 6.1 offers a way of thinking about lifestyle that helps unfold complexity and makes clear many factors that affect farmers and their environments. Thus, SLF appears to be a useful method for investigating perceptions of livelihood on account of its capacity to include a full range of elements affecting a farmer’s way of life.
6.5 RESEARCH METHODS

6.5.1 General Description of the Study Areas

This sub-section presents the general description of the study areas and justifies why these sites were chosen for this study. Cocoa is grown in thirteen (13) provinces of Papua New Guinea (Cocoa Board of PNG, 2012). Vudal and Burit villages of the Gazelle District in East New Britain Province (ENBP), and Wampup and Gabsongkeg villages of the Huon Gulf District in the Lower Markham area of Morobe Province (MP) were chosen as study sites (see Figure 6.2, PNG Map).

Vudal and Burit villages (the study sites) are located in the Inland Baining Rural of Gazelle District in the north west of East New Britain Province. The Gazelle District lies between 4.3502° S and 152.0418° E and covers a total area of 3,700 km², of which 1,176 km² is occupied. Population in the occupied area is 76.3 people per km², which is quite dense compared to other regions (The National Research Institute, 2010).

Figure 6.2 Map of Papua New Guinea indicating the study location (Morobe and ENBP)

Source: CSU SPAN
Wampup and Gabsongkeg villages are located in the Wampar Rural in the Huon Districts respectively that runs from the inland areas of the Lower Markham valley, lying between 7° S and 147.45° E. The Huon Gulf District covers a total area of 7,401 km², of which 1,906 km² is occupied and the population in the occupied area is 31.2 people per km² (The National Research Institute, 2010).

6.5.2 Justification for Choosing the Two Study Locations

Of the thirteen (13) cocoa growing provinces, East New Britain Province (ENBP) and Morobe Province were selected as sites for this study for the following reasons:

i. Both are major cocoa producing provinces in the country (Bourke and Harwood 2009)

ii. Both provinces have a long history of growing cocoa apart from the Autonomous Region of Bougainville (ARB) and East Sepik Province (ESP)

iii. Both provinces have the Cocoa Coconut Research Institution (CCI) and the National Agricultural Research Institute (NARI) established, together with their respective
extension agents, where more extensive cocoa research and extension work is conducted, compared to any other cocoa growing provinces in the country.

iv. Both provinces have a well-developed infrastructure relative to other cocoa growing provinces (Bourke & Harwood, 2009).

v. The author is native and has worked and lived in both provinces in the past and is familiar with their culture and tradition.

vi. The chosen sites where data were collected are areas where CCI and NARI researchers and their extension agents have conducted training and research over the years and have some linkages.

Despite the similarities between the sites, there are important cultural differences between the provinces. People from ENBP have a different culture and different languages to the people of Morobe. For example, people from ENBP and other island provinces are a matrilineal line of society where women become the head of the family and make key decisions on land, finance or labour usage (Ghodake et al., 1995) whereas Morobe and other mainland provinces have a patrilineal line of society where the men are the head of the family. Family structures, kinship systems, patterns of settlement and inheritance, house styles, land tenure systems, and even religious beliefs and rituals differ (Ghodake et al., 1995; Omuru, Nailina, & Fleming, 2001; Vien, 2003). Culture, therefore, plays an important role in farming and resource management, and these differences provide a valuable focus for this study to explore.

6.5.3 Methods of Data Collection

The purpose of data collection is to provide the materials for understanding the context and issues relevant to the research questions and to develop and refine concepts. Triangulation is the combination of two or more data collecting approaches and analysis methods to study the same phenomenon (A. Hussein, 2009). The benefits of using these approaches include richness of data and deeper insight into the phenomena under study. Undertaking a phenomenological approach based on the nature of this study was the method of data collection employed.

There were two stages of data collection used in this study. A key informant interview was conducted in Stage 1 of the study, followed by in-depth semi-structured interviews in Stage 2. In both stages, complementary tools and techniques were used as well to capture additional data that were not previously collected, including desktop studies, observations and informal note taking.
6.5.4 Research Stage 1: Key Informant Interviews

Key informant interviews were conducted initially in both study sites. Key informant interviews are in-depth interviews using probes (see Appendix 6.1) with people considered well informed about activities and events in the community, and specifically about cocoa production. The purpose of key informant interviews was to collect information from a wide range of people including farmers, community leaders, extension and research agents, and service providers (see Table 6.2). Key informant interviewees in the villages were, chairman of farmers’ cooperative group, leader farmers involve with NARI, Provincial Government, NGO, or donor funded agricultural project managers, village councillor, etc. They have vast experience and good network with service providers and have a firm understanding of fellow farmers’ livelihoods and issues. Their experience and exposure are different from an average ordinary village farmer. The outcome of these interviews provided background information providing guidance to the research questions that were later constructed for Stage 2 of the research.

6.5.5 Research Stage 2: In-depth Semi structured Interviews

After the analysis of the key informant data, the research problem was further defined and the interview questions for Stage 2 were then developed for the purposes of in-depth semi-structured interviews (see Appendix 6.2 for the details of the questions used). Stage 2 interviews were conducted in all study sites (see section 6.5.1). Participants interviewed included farmers, extension and research officers, and managers of both private and public organisations, as indicated in Table 6.3. Interviews were recorded using a voice recorder and notes were also taken including notes on body language and any other reactions towards the questions being asked. Other observations and informal discussions were also noted in a note book.

Farmers were interviewed in the evening after they returned from the day’s activities, whilst the extension and research officers were interviewed during official working hours in their offices. Each interview took 20 – 50 minutes, until no new information emerged.

6.5.6 Sampling and Sample Size

Qualitative sampling may be described by many different terms, but most is classified under three major categories of sampling: purposeful, convenient, and theoretical. Due to the nature of this study the purposeful sampling method was used.
**Purposeful sampling** seeks to include respondents who represent the widest variety of perspectives possible within the range identified as relevant to maximise variation in sampling (Higginbottom, 2004). Purposeful sampling was considered to be ideal, as it is advantageous to study a broad range of subjects (maximum variation) and collect information from people with special expertise (stakeholders) in various hierarchical levels, from cocoa producers to policy makers and implementing agents. These may include, for example, policy level people (government), technology developers and implementers (cocoa researchers and extension agents), growers (farmers), input suppliers (suppliers of fertilizers/pesticides, tools, credit agents), marketing agents (cocoa buyers, processors, exporters), and Cocoa Board workers (regulatory & quality controllers).

A pitfall in purposeful sampling is to select a sample that is not diverse enough to represent the variation known to exist in the population or phenomenon being studied. To overcome this, the participants in this study were recruited from different research and extension organisations, and in the case of farmer participants, from different villages and locations (East New Britain Province and Morobe Province).

### 6.5.7 Sample Size and Participants

Most qualitative researchers aim to keep collecting data until they have saturation, or until nothing new is learnt, in accordance with the notion of theoretical saturation derived from Glaser and Strauss’s (1967) influential account of grounded theory. Saturation method is described as a process in which the researcher continues to sample relevant data until no new information are being extracted from the data. Saturation is often claimed when there is little evidence that it has been employed as a criterion for deciding when to stop sampling (Bryman, 2012; Guest, Bunce, & Johnson, 2006). Nevertheless, it is sometimes suggested that there are minimum requirements for sample size in qualitative studies (Bryman, 2012). Various scrutiny panels will still require the researcher to determine their sample size. For example, Bryman (2012) suggested that the minimum number of interviews should be between twenty and thirty for an interview-based qualitative study for publication. However, Gerson and Horowitz (2002) suggested that less than 60 interviews cannot support convincing conclusions and more than 150 produces too much material to analyse effectively and expeditiously. Contrasting these figures (20-30 versus 60-150) strongly suggests that there is quite a lot of variation in what is believed to be the minimum requirement, so it is unsurprising to find that actual sample sizes
vary considerably in qualitative research. There is no fixed agreement on what minimum sample size should be. Thus, it is important that the researcher must be prepared to justify the sample sizes that are undertaken (Bryman, 2012). In this study saturation point determined the number of respondents interviewed.

As described in section 6.5.3, data were collected in two stages; firstly key informant interviews and later semi-structured in-depth interview. The number of key informant participants interviews in stage one (1) is illustrated in Table 6.2 and semi-structured interview in stage two (2) in Table 6.3 respectively.

Table 6.2 Stage 1: Key Informant interview participants and size

<table>
<thead>
<tr>
<th>Participants</th>
<th>Location</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>East New Britain Province</td>
<td>Morobe Province</td>
</tr>
<tr>
<td></td>
<td>Vudal</td>
<td>Burit</td>
</tr>
<tr>
<td>Farmers</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Village Leader</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

For Stage 2 data collection, twenty one (21) smallholder farmers and ten (10) extension and research agents were interviewed to a total of thirty one (31) participants of which two (2) were female, as depicted in Table 6.3. Justification of such sampling population was only established after reaching a saturation point, meaning the number of participants was based on the point where no new information emerged.

Table 6.3 Stage 2: In-depth semi-structured interview participants

<table>
<thead>
<tr>
<th>Matrix ‘A’</th>
<th>Participants</th>
<th>Location</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Province</td>
<td>Vudal</td>
<td>Burit</td>
<td>Wampup</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>East New Britain</td>
<td>5 + 1*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morobe Province</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Matrix ‘B’

<table>
<thead>
<tr>
<th>Participants (Officers)</th>
<th>Institutions/Organisations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CCI</td>
<td>NARI</td>
</tr>
<tr>
<td>Extension</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Researchers</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Managers</td>
<td>1*</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Note: * 2 female participants.

### 6.5.8 Inductive Approach for Qualitative Data Analysis

The inductive approach is a methodical procedure for analysing qualitative data where the analysis is guided by specific intention (Thomas, 2006). According to Mackey and Gass (2015), the primary purpose of the inductive approach is to allow research findings to emerge from the frequent, dominant or significant themes inherent in raw data, without the restraints imposed by structured methodologies. Key themes are often obscured, reframed or left invisible because of the preconceptions in the data collection and data analysis procedures imposed by deductive data analysis, such as those used in experimental and hypothesis testing (Thomas, 2006).

The following are some of the rationale underlying the development of the general inductive approach as highlighted by Thomas (2006). These purposes are somewhat similar to other qualitative analysis approaches:

i. To condense extensive and varied raw text data into a brief, summary format.

ii. To establish clear links between the research objectives and the summary findings derived from the raw data and to ensure these links are both transparent and defensible (justifiable given the objectives of the research).

iii. To develop of a model or theory about the underlying structure of experiences or processes which are evident in the text (raw data).
Furthermore, Strauss and Corbin (1990) stated that an inductive approach helps to understand the meaning in complex data through the development of summary themes or categories from the raw data (data reduction). Essentially, it involves the transformation of raw data into a final description, narration, or themes and categories, for example by use of NVivo software. There is considerable variation in how this is undertaken, depending on the research questions and the approach taken by the researcher (Vishnevsky & Beanlands, 2004).

6.5.9 The Use of NVivo Software in Data Processing and Coding

There are different methods and process of data analysis. What is important is that the process should be described in sufficient detail to enable the reader to judge whether the final outcome is rooted in the data generated (Holloway & Wheeler, 2002). Nevertheless, in this study, the computer-assisted package of NVivo 10 (Robson, 2002) was used in coding and thematic analysis of the raw data. NVivo software was used in analysing the data because of the research methodology and approach chosen, and the amount and type of data collected.

The voice recorded interview data from interviews were transcribed from “Tok Pidgin” to English, and then entered into the computer, and subsequently analysed using the NVivo software package. The transcribed data were firstly coded from actual statements into certain broad themes according to the emerging ideas and the topic concepts based on the research questions. These themes were further divided into nodes and sub-nodes in a hierarchical structure as tabulated in Table 6.4.

Table 6.4 Summary of broad themes with number of nodes

<table>
<thead>
<tr>
<th>Broad Themes</th>
<th>No. of Nodes</th>
<th>Broad Themes</th>
<th>No. of Nodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betel nut</td>
<td>4</td>
<td>Farming</td>
<td>4</td>
</tr>
<tr>
<td>Changes</td>
<td>5</td>
<td>Issues of concerns</td>
<td>8</td>
</tr>
<tr>
<td>Cocoa</td>
<td>16</td>
<td>Land tenure and size</td>
<td>3</td>
</tr>
<tr>
<td>Concept of livelihood</td>
<td>3</td>
<td>Livelihood activities</td>
<td>8</td>
</tr>
<tr>
<td>Constraints and problems</td>
<td>7</td>
<td>Livelihood outcomes</td>
<td>4</td>
</tr>
<tr>
<td>Culture and traditions</td>
<td>10</td>
<td>Enabling agents &amp; Government services</td>
<td>6</td>
</tr>
<tr>
<td>Decision making</td>
<td>2</td>
<td>Support and Assets</td>
<td>8</td>
</tr>
<tr>
<td>Demographic data</td>
<td>7</td>
<td>Understanding farmers</td>
<td>6</td>
</tr>
</tbody>
</table>
The broad themes from Table 6.4 were merged with data obtained from the desktop study, observations, discussions, and the past key informant interviews that provided rich qualitative data, and the themes were further converged into three (3) main topics or theme categories as follows:

(i) Human settings of the study areas (the Tolai and Wampar villages).
(ii) Assets and livelihood strategies (diversification).
(iii) Modus operandi of cocoa research, development and extension (RD&E).

Table 6.5 The summary of the main theme categories being investigated

<table>
<thead>
<tr>
<th>Theme Categories</th>
<th>Broad Themes*</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human settings</td>
<td>Demographic data, culture and traditions, decision-making, issues of concerns, land tenure and size.</td>
<td>Semi-structured interview (SSI), desktop</td>
</tr>
<tr>
<td></td>
<td>Pattern of human settlement, political organisation, village economy and social organisation.</td>
<td>SSI, desktop, observation, discussions</td>
</tr>
<tr>
<td>Assets and livelihood strategies</td>
<td>Changes, cocoa, betel nut, concept of livelihood, culture and traditions, decision making, diversification of livelihood, farming, issues of concerns, land tenure and size, support and assets, vulnerability &amp; risk, and livelihood outcomes.</td>
<td>SSI, observations, discussions</td>
</tr>
<tr>
<td>Modus operandi of cocoa research, development and extension</td>
<td>Changes, cocoa, extension approach, farming, issues of concerns, enabling agents &amp; government services, success, and understanding farmers.</td>
<td>SSI, observations, discussions</td>
</tr>
<tr>
<td></td>
<td>Cocoa research and development, approaches to farmers, cocoa support institutions and structural arrangements.</td>
<td>Key informant interview (KII), SSI, desktop, discussions</td>
</tr>
</tbody>
</table>

Note:* The broad themes were derived from the data analysed mainly from the semi-structured interviews (summarised in Table 6.5) however some data also came from discussions, desktop study, observations and from key informant interviews from the previous fieldwork.

The three (3) themes or categories in Table 6.5 actually form the headings of the next three (3) result chapters (see Chapter 7, 8, and 9) that branch into broad themes and further sub themes.
6.6 PRESENTATION OF FINDINGS

Findings from this study are presented as narratives (story), themes, and descriptions of the phenomenon (findings), as well as interpretive accounts of the researcher’s observations, understandings and experience. The findings of the study were related back to the research questions and literature to justify whether or not the research questions have been properly addressed, as is in line with the analogy of Thorne and Darbyshire (2005).

6.6.1 Research Limitations

Every research activity has its own challenges, depending on the specific context within which it is carried out (Katz, 1994). In this study, although I am native to Papua New Guinea, culture and traditions of the study sites differ within and among other provinces. Accordingly, there were several challenges at the research level. For example, in both study sites, it was not possible to interview a woman farmer alone, unless she was accompanied by her spouse as part of their custom. Apparently, most women were reluctant when asked to be interviewed in this study and consequently only two females were interviewed.

Secondly, most farmers are illiterate and were unable to speak or write in English. They generally spoke their own local vernacular (Kuanua or Wampar) and ‘Tok Pidgin’. Even though I am proficient in the ‘Tok Pidgin’ language, asking questions in ‘Tok Pidgin’ and translating from ‘Tok Pidgin’ to English was a challenge. In fact, some questions could have perhaps been phrased better, although there are no fixed guidelines either on the manner of asking questions or on framing ideal questions in qualitative research. Nevertheless, after the interviews it took a lot more time to transcribe the data from ‘Tok Pidgin’ to English.

Further, the holistic approach taken in this thesis contributed to limit the depth of investigating the data in detail. These factors may have influenced the richness and reliability of data, however, as a study without a precedent of its kind, such a holistic level of investigation was both necessary and appropriate.

Finally, the study was conducted in two of the 14 cocoa growing provinces in PNG. It must be noted that the study of other cocoa growing provinces was beyond the scope of this research due to limited time and funding. It is possible that the findings could not be extended to other districts or provinces with the same degree of certainty in the context of understanding the livelihoods of those farmers. A descriptive analysis of this study can later be tested empirically using a quantitative approach.
6.7 CHAPTER SUMMARY

The primary purpose of this chapter was to describe and explain the qualitative research inquiry framework or theory used in guiding this study so that there was clarity as to the research purpose, guideline, and the process of data analysis. This required a summary account of the research context, paradigms, research design and framework, study sites, methods, data processing and analysis, and challenges encountered.

The nature of the overall phenomenon investigated as described from the title of this thesis, and the manner of research questions emanating from the primary aim and specific objectives, justified the need to undertake phenomenological approaches to this study. Therefore, a sustainable livelihood approach was employed in this investigation that developed into a framework.

This study took an approach with a view of phenomenological essence. Therefore, semi-structured, an open-ended interview schedule was used in collecting data from cocoa farmers and extension and research officers to a point of saturation where no new information emerged. Data were enriched by obtaining more information from the discussions, desktop study and observations. Displaying the data was important as it briefly defined the population sample of the interviewed participants, showed how the data were analysed, and the themes emerged from the data. The themes were categorised into three (3) main topics of the result chapters as follows: the human settings of the study areas; assets and livelihood strategies; and modus operandi of cocoa research, development and extension in PNG. These topics are described further in the three (3) result chapters that follow.
CHAPTER SEVEN: HUMAN SETTINGS AND ECONOMY OF THE STUDY AREAS

The previous chapter considered several theoretical perspectives on research methodology. The chapter also described the conceptual model guiding this study as a framework (SLF), while detailing the specific methods being used (semi-structured interviews). It further described how data were analysed and the results subsequently merged into three (3) main themes and this chapter presents one of the themes.

As this study is concerned with examining the social and cultural factors affecting cocoa production within PNG, with a particular emphasis on investigating the role self-perceptions of livelihood play in creating production change, this chapter seeks to provide a foundational understanding of village society within the study site. To achieve this, human village settings of the study sites are described based on desktop reviews and from data collected.

7.1 INTRODUCTION

This study was carried out to understand the smallholder cocoa farmers’ livelihood and to establish the factors influencing decision making in livelihood activities (diversification) and in production of cocoa. Through the process of interviewing the farmers, it became apparent that the human setting of these farmers was intrinsic as their background affects their livelihood and cocoa production. The human setting and the economy of a society is fundamental as it enables the people to undertake what they feel is important in their livelihood. People consider things other than cocoa are more important in their lives. For this reason it was important to understand farmers’ backgrounds and the physical features that affect their choices of livelihood activities, therefore, a desktop analysis was added to the research and the findings are presented in this chapter. The chapter presents the key elements of human settings of the study areas (Morobe and East New Britain Provinces) in order to establish some baseline understanding of the physical and socio-cultural features of these regions since it is critical to understand the history and socio-cultural detail in order to grasp the role ‘livelihood’ plays in influencing investment or commitment to cocoa production.

The importance of exploring the human settings of the study areas is to provide an understanding of the people (Tolai and Wampar) and their environment in terms of their history of the settlement, their socio-demographic characteristics (presented in Appendix 7.1), the
political organisation (presented in **Appendix 7.2**), the village settings, and the social organisations (such as culture, land tenure, kinship, labour usage, and so on). Such understanding establishes their livelihood patterns and these are vital attributes in the investigation of this study. Before proceeding with the description of human settings, it is important to be familiar with certain concepts and words, including some local terms often used in the findings and discussion chapters. These are defined in **Box 7.1**.

<table>
<thead>
<tr>
<th>Glossary of Important Terms</th>
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<tbody>
<tr>
<td>This box provides the definition of some unfamiliar words to readers and defines some known terms in the context of what they mean in this study.</td>
</tr>
<tr>
<td>• Baining(s): these people are among the earliest original inhabitants of the East New Britain Province (ENBP) and currently they inhabit the mountains or inland of ENBP. The Tolai people arrived later.</td>
</tr>
<tr>
<td>• Puripuri: refers to strong supernatural forces of different spirits or witchcraft believed to be practised by some Tolai people and in other coastal regions of PNG.</td>
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<tr>
<td>• Block: refers to a piece of land owned by a farmer where cocoa and other food crops are grown (often less than 2 ha.). The farmer also builds his house(s) on the same piece of land.</td>
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<tr>
<td>• Farmer: is a person living in a rural village and engaged in agriculture and other non-farming activities to survive.</td>
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<tr>
<td>• Household: is composed of one or more nuclear families, sometimes including foster children or workers from other ethnic groups living together.</td>
</tr>
<tr>
<td>• Kuanua: is the common local language of the Tolai people.</td>
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<tr>
<td>• Livelihood: is ‘the way people combine their capabilities, skills and knowledge with the assets at their disposal to create activities that will enable them to make a living’ (Ireland (2004).</td>
</tr>
<tr>
<td>• Non-farming: refers to those activities that are not primary agriculture; however, it does include agricultural trade, fishing, or processing of agricultural products.</td>
</tr>
<tr>
<td>• Off farming: refers to activities undertaken away from the household’s own farm, or activities that are non-farming. For example: employment in cities, trade store or a sawmilling business, engaging in social and/or spiritual obligations etc.</td>
</tr>
<tr>
<td>• Pidgin or Tok Pisin: is an official language of Papua New Guinea (PNG) and the most widely used language in the country.</td>
</tr>
<tr>
<td>• Smallholders: refers to subsistence farmers, often farming less than two (2) hectares of land.</td>
</tr>
<tr>
<td>• Tambu or Tabu: a shell money, an alternative medium of exchange used only by the Tolai society and still highly valued as a currency by the Tolai people.</td>
</tr>
<tr>
<td>• Tolai: refers to natives of the East New Britain Province who settled after the Bainings. The Vudal and Burit villagers are Tolai people.</td>
</tr>
<tr>
<td>• Wampar: refers to natives of the Huon Gulf District of Morobe Province. Wampup and Gabsongkeg villagers are known as the Wampar people.</td>
</tr>
<tr>
<td>• Wantok system: is a culture in PNG that is acquired through one’s life to be responsible and supportive of others of the same ethnic background in terms of basic needs and security.</td>
</tr>
<tr>
<td>• Hombru: Home-brewed alcohol made from ripe banana, fruits and yeast and is illegal.</td>
</tr>
</tbody>
</table>
The Vudal and Burit people, who are known as ‘Tolai’, are part of the Gazelle District of East New Britain Province (ENBP), while the Wampup and Gabsongkeg people are known as ‘Wampar’ and they live in the Huon Gulf District of Morobe Province (MP). Some of the key elements of the pattern of the human settlement of the Tolai and the Wampar people are presented below.

7.2 PATTERN OF HUMAN SETTLEMENT

Vudal and Burit villages are in the Gazelle District of East New Britain Province (ENBP) and the capital is Kokopo (see Section 6.5.1). East New Britain covers a total land area of 15,816 square kilometres, and the province’s population was 328,369 in the 2011 census. There are a number of languages spoken in the province, of which Kuanua is the common language of the Tolai; however Pidgin is widely spoken and is the means of communication with non-natives or others, locally referred to as ‘outsiders’.

On the other hand, Wampup and Gabsongkeg villages are in the Wampar Rural Local Level Government within the Huon Gulf District of Morobe Province, located about 35-40 kilometres from the centre of Lae City along the Lae-Madang and Highlands (see Figure 6.3). There are sixteen (16) Austronesian languages spoken in the province. In the study sites of Wampup and Gabsongkeg village they speak Wampar language. Pidgin (Tok Pisin) is widely spoken and is the means of communicating with non-natives or outsiders.

7.3 HUMAN SETTLEMENT OF THE TOLAI PEOPLE

When the Australian Government passed the Land Act 1962, customary land was bought through a process called Native Land Dealing by the National Government. This enactment was part of the land settlement scheme policies of the Australian Administration (throughout PNG) and resulted in large tracts of land along the Warangoi, Kerevat, Vudal, and Lower Baining areas being purchased. The Australian Administration then leased these blocks of land to individuals from Tolai villages near Rabaul and Kokopo for agricultural purposes. That is how the Tolai people, who were living mostly along the coast in Rabaul and Kokopo, moved inland and settled in Vudal, and subsequently moved further inland to Burit villages.
7.3.1 Settings of Vudal and Burit Villages of East New Britain Province

7.3.1.1 Vudal Village

The Vudal village shares a border with The University of Natural Resources and Environment (UNRE) (formerly known as University of Vudal). The villagers are from different parts of East New Britain, but most originate from Rabaul and Kokopo areas. Each individual family owns a block of land of less than two (2) hectares. Most settled there in the late 1960s and early 1970s through the Government’s land settlement scheme (LSS) and via customary land. Figure 7.1 is a map of Vudal village that gives a clear understanding of the location of the village.

![SKETCH OF VUDAL VILLAGE](image)

Figure 7.1 Sketch map of Vudal village

Almost all the blocks are occupied with both old and new cocoa trees and food gardens. Far from the north-west, the Vudal River flows to the sea. Houses are built on each block and their size depends on the family size. Houses are of mixed types; traditional, permanent and semi-permanent. Traditional houses have wooden stilts and thatched roofs made from leaves of the sago palm which are sewn together. Permanent houses are constructed with corrugated iron roofs and sawn timber. Gutters from the roofs are piped to fibreglass or corrugated tanks for water collection. The semi-permanent houses are built using bush timbers as frames, and woven blinds as walls, but the roofs are covered with corrugated iron.
Almost all of the population depends on rainwater (collected from gutters into tanks or drums) as their primary source for drinking and cooking. They also have a few old underground wells that are used for bathing, washing clothes and other uses. However, the people living in the west of Vudal have access to the Vudal River so they use the river as their main source of water for bathing, laundry and fishing. There is no water supply system in the village except for a few blocks adjacent to the University of Natural Resource and Environment (UNRE) campus. People along the main road of Vudal have access to electricity that runs to the UNRE campus, otherwise most inner blocks are without electricity. There is a primary school in a village and an aid post. Some villagers use the UNRE’s clinic for treatments, but referrals are in Kerevat Rural Hospital or the Health Centre at Livuan Reimer Local Level Government (LLG), a one-hour’s walk away. There is a United Church in the village near the main road adjacent to UNRE Campus.

7.3.1.2 Burit Village

Burit village is up on the hills located approximately 15km south-west of University of Natural Resources and Environment (UNRE). The original landowners of Burit are known as the Bainings. The land settlement scheme (LSS) by the Government in the 1960s made it possible for the people of Rabaul and Kokopo to purchase or lease blocks of land from the Baining and these ‘outsiders’ now make up three quarters of the Burit community. The other quarter are the traditional Bainings who are the ultimate landowners and have authority and rights over the land in Burit.
Almost all the blocks surrounding Burit village comprise cocoa trees and food gardens. There is forestland towards the mountains that belongs to the Baining people, but the use of the resources from the forest is subject to authorisation from the clan leader of the Baining. Below the hills is a small creek that runs towards Vudal. There is no electricity supply to the village. Most villagers use hurricane lamps or battery powered torches for light, but only a few own small electric generators that supply electricity for specific uses such as the trade store (lights and refrigerator), watching television, charging mobile phones, and/or for church services in the evenings.

Houses are built in each block according to family size. Most houses are similar to those of the Vudal village as depicted in Plate 7.1. Almost all residents depend on rainwater (collected in tanks and drums) as their primary source for drinking and cooking. Heavy laundry is carried out in the creek down the hill. There is a primary school down the village and an aid post. Some villagers use the UNRE’s clinic for treatments, but referrals are to Kerevat Rural Hospital. There is a Uniting and a Pentecostal Church in the village. Most of the people there work on their land to survive, however there are few who work with The University of Natural Resources & Environment (UNRE) as casuals, or are engaged in other non or off-farming activities.
7.4 HUMAN SETTLEMENT OF THE WAMPAR PEOPLE OF MOROBE PROVINCE

The Wampar are a group of people occupying the area of the middle Markham River in Morobe Province, Papua New Guinea. The two study sites are Gabsongkeg and Wampup villages that are part of the Wampar group who speak Wampar language. Not much of the history of Markham, including its prehistory, is written. Rather most of the history is folklore, although recent socio-linguistic and anthropological studies give some hints about the roots of the Wampar with claims that they migrated predominately from Watut (Bacalzo, 2012; Bacalzo, Beer, & Schwoerer, 2014; Beer, 2006b; Paris, 2012). The presentation of Wampar history below is a result of desktop study and consensus reached by most interviewees, and chats with village elders. One village Elder explained the origins of the local people:

‘Our forefathers came from the mountains of Saruwaged and settled there, but some are believed to have come from the Watut area. They (Wampar people) belong to two tribes called Geaganson and Orognaron. My grandfather came here through friendship and intermarriage here so my father was brought up here’.

The Wampar people living in the Lower Markham area belong to two tribes called Geaganson and Orognaron, who migrated down to the valley fleeing from warfare. According to tradition, they likely drove away other ethnic groups at the time. The Wampar group were, in fact, nomads as they moved across the Lower Markham Valley, towards the Markham River, and Gabensis area. As they moved one or more related lineages settled in hamlets and grew food gardens. After the crops were harvested and the soil depleted, they moved on to other areas in search of food.

They claimed all the land they settled on through their movement and in doing so, acquired most of the land of the Lower Markham areas. Knowing such background provides us with an understanding of who are the legitimate landowners and the land use rights (e.g.; to plant cocoa) in the study areas.

The Geaganson and Orognaron tribes had some allies who helped them in tribal fights during that period so the allies were given some portion of land along the Lower Markham valley in return. Later, as more people up the mountains migrated down to the valleys and via inter marriage, helping in warfare or through barter systems, the relationships and friendships within and between the Geaganson and Orognaron clansmen were enhanced and led to a sharing of land entitlements. In fact, only a few families in the Wampup and Gabsongkeg villages are original landowners while the rest came to live in the villages through friendship and intermarriage.
7.4.1 Settings of Wampup and Gabsongkeg Villages

7.4.1.1 Wampup Village

The Wampup Village is about 42 kilometres west from Lae, the capital city of the Morobe Province. The village is located at the North-West side of Nadzab Airport, situated at the back of Trukai Farms along the Erap plains of the Markham Valley (see Figure 7.3). It is about 5 kilometres in from Erap Trukai Farm Office and Erap Department of Agricultural & Livestock Station off the main Highlands Highway.

Approximately 300 hectares of that land are owned by only one person, while 200 hectares is shared by the community members. By familial linkage to the estate the person who owns 300 hectares has overall authority of the land to some extent.

![SKETCH OF WAMPUP VILLAGE](image)

**Figure 7.3 Sketch map of Wampup Village**

About 90% of the land is idle, however a portion of the area is used to raise cattle while the remainder is used for farming crops, housing and recreational use. The main cash crops are cocoa and coconuts, however, surplus crops from the food gardens are often sold in local markets for cash income purposes.
The area is dominated by vast kunai grassland and shrubs. Far from the west flows the Erap River. Most houses are somewhat similar to those of Vudal and Burit.

Plate 7.2 Typical village house types in Wampup Village

The village depends on tank water as its primary source for drinking, and the village well supplies water for cooking, washing, laundry and other uses. There is also alternative water piped down from the mountain, but this supply dries up during the dry seasons. Piped water is sometimes used for irrigation purposes and for the cattle and horses. People in the village do not have access to electricity. Three locals who own canteens in the village use small generators to provide electricity for lights and refrigeration. There is a sand road from the village to the main highlands highway that is often maintained by Trukai Rice, an Australian company that has rice fields near the village. There is a primary school and an aid post near the village. Some villagers attend Wampar Health Centre near Nadzab Airport (about seven kilometres from the village) for medical treatment. There is a Lutheran Church in the village which most attend.

7.4.1.2 Gabsongkeg Village

Gabsongkeg village is approximately 35km west of Lae City and is located on the east side of Nadzab Airport about a kilometre off the main Highlands Highway. The village is in the proximity of the Wampar Local Level Government Station. There is a local market along the highway near the turn off into the village and the airport, primary school, and a Health centre at Wampar LLG Station, which is a kilometre from the village. There is a Lutheran Church in the village as well (See map below -Figure 7.4)
The original land owners of Gabsongkeg village in recent times have been selling portions of their land to outsiders from other provinces. This has brought in people of mixed cultures and ethnic groups now settling in Gabsongkeg and the neighbouring villages. Each household occupies 2-3 hectares of land on average. There are no forests, but shrubs and kunai grassland surround the village. About 80 percent of the land is used for farming, housing and recreational purposes unlike the Wampup village.

The common food crops and cash crops grown are similar to what is grown in the Wampup village. Although the Gabsongkeg villagers do not raise cattle, they do raise large number of meat birds (chickens) for the Niugini Table Bird (NGTB) Company via contracts to farmers.

7.5 VILLAGE SOCIAL ORGANISATION

There is a need to understand the social organisational aspects of the people in the four study areas because the livelihood systems of these people in terms of decision-making and choices of livelihood activities revolve around such organisational processes. The overview below therefore, is based on what was acquired through semi-structured interviews, discussions, a desktop study, and from informal conversations with villagers, observations, and personal experiences.
7.5.1 Socio-culture and Beliefs

Culture is a complex phenomena which includes knowledge, beliefs, art, morals, laws, customs, way of life, and other capabilities and habits acquired by the people as members of particular society (Ray, 2003). The culture of Papua New Guinea is complex with more than 800 different languages and cultural groups. The Tolai people have their own unique customs, traditions, and beliefs that are different from the Wampar and the rest of the region. The ownership of traditional knowledge among the Tolai is highly regulated and the ways of acquiring it are clearly defined. Knowledge is owned either by an individual, a group, or the wider public and may be protected by means of secrecy (Simet, 1992). Types of traditional knowledge could include traditional medicinal healings, dances, songs, or something in the arts. However, one common culture that almost every society in PNG practises, including the Tolais and Wampars, is the ‘wantok system’ as described below.

7.5.2 The ‘Wantok System’ Culture

One feature of a Papua New Guinean’s fundamental and significant culture is the ‘wantok system’ (in pidgin), which when translated to English means ‘one-talk’. Wantok is a term used in reference to anyone who speaks the same language, comes from the same area, and has a common social association or ethnic background. The wantok system is a culture that is acquired through one’s life to be responsible and supportive of others from the same ethnic background. Within the norm of the extended family or clan, each member can expect basic provisions and sustenance such as housing, food, health care, security, money, and a general sense of inclusion and belonging. The reward is that they can expect the same in return when the need arises. People see this as an affirming way for the community to share its resources, and it is widely accepted. The wantok system has important values and meanings that bind and strengthen the people and their traditions.

The wantok system worked well with traditional cultures until after PNG’s Independence in 1975. Subsequently it appears the wantok system slowly blended with the western influence in the administration and operation of many organisations and institutions, especially by the nationals, thus affecting the country and the society. For example, the wantok system can lead to nepotism in all levels of government, industry, institutions and society, including leading to instances of corruption. A person does not necessarily have to work hard in order to get what they want, as one government extension officer interviewee suggested:
‘Besides there is some nepotism practised at allocating housing within staff and even promotions... wantok system is still practised in all levels of management’. (AMeEO)

Such instances can lead to a variety of other consequences, as another government employee interviewee suggested:

‘... this wantok system that is making people become lazy and depending on others. Those who work hard have to share with lazy family members. We are too much dependent on others’.

Nevertheless, the wantok system is still part of the PNG culture and it affects farmers and all other walks of life regardless of education, religion, or ethnic background. The wantok system is strong in the study areas (Vudal, Burit, Wampup, and Gabsongkeg). The Wantok system is part of a culture that stands out as an identity of a Melanesian society with its own implications and concerns, and people continue to practise it today.

Besides the wantok system, the Tolai and Wampar people have many other unique cultural structures. The culture of the Tolai people is presented first, and then, in contrast, the Wampar society. This contrast shows how these cultures affect livelihood activities.

7.5.3 The ‘We Factor’ Culture in the Tolai Society

Most Tolai people believe strongly in supernatural forces of different spirits or witchcraft known as ‘puripuri’. It’s important to understand the influence of ‘puripuri’ on the Tolai people’s livelihood and their behaviour towards sharing their resources as a group (referred to as the ‘we factor’) rather than sole advancement.

Humans by nature have an instinct to belong to a society, as described in Maslow’s ‘need theory’ (Maslow, 1970). Accordingly, Tolai people, like other societies in Papua New Guinea (PNG), have the desire to meaningfully engage and share values and beliefs in their habitat. People depend on each other by means of the wantok system and are part of Tolai and PNG culture. Nevertheless, the Tolai people apparently have another extrinsic factor apart from the wantok system that influences them to share and work together in groups or society, and that is believed to be the fear of ‘black power’ or ‘puripuri’ spells. This is explained by a smallholder farmer interviewee:

‘We also believe in ‘puripuri’ [black power or supernatural spirits] as if we succeed in business or increase in wealth, then we fear of being attacked by other clan or even jealous relative using ‘puripuri’. Even Christianity beliefs have strong influence on us, but to some scale of degree, fear of ‘puripuri’ is still there’.
The fear extends to the belief that evil spirits may be spelled on them by other clans if they advance in acquiring wealth or venture into business to elevate to a higher standard or status than the rest. The fear keeps them on a standard platform so they choose to live equally along with the rest of the community and progress or advance together rather than excel individually, so as to safeguard themselves from black power or ‘puripuri’. This is highlighted by comments from one villager at Burit Village, who suggested:

‘One of the problems this community faces is the impact of cultural beliefs. I do not believe, but most people believe in black power or sorcery. They want to set up small businesses like trade stores, or transport, but are scared of ‘puripuri’ from people who have some kind of physical power to destroy them’.

Another suggested such views extend to farming practices:

‘I have an interest in going into alternative cash crops, but it’s me alone, while majority of the people want to remain in cocoa, I think I have to go with the people [raising voice]. It will be stupid for me to go alone in one cash crop when no one in the community wishes to follow’.

Another implied that culture had an important impact on business development as well:

‘The other thing is we believe that caring and sharing is paramount. If you want to start a business, then you need to start up everyone else around you, because if you start a business and everyone around does not have anything then how can your business prosper? You need to include everyone else around you to have something so that they can participate in your business. Otherwise, you start a business while the people have nothing, then that business will not prosper because the very people will get you down. That’s why we have that culture of caring and sharing, visiting one another to prosper together’.

The fear of ‘puripuri’ could be an external factor along with the wantok system to congregate farmers to work together in groups and progress together as a community, referred to as the ‘we factor’. ‘We factor’ culture emphasises relationships among people to a greater degree, stressing interdependent activities and suppressing individual aims for the group’s welfare. Often, it is difficult for individuals from highly individualistic cultures (Westerners) to understand ‘we culture’ values.

7.5.4 The ‘I factor’ Culture of the Gabsongkeg and Wampup Villages

Generally, the common cultural principle in PNG is collectiveness or ‘we factor’ that integrates individuals into strong and cohesive groups that throughout their lifetimes continue to support and protect with unquestioning loyalty. However, not all societies need to be collectivist. Rather, in some aspects or rituals of certain societies as in Gabsongkeg and Wampup villages, an individualistic approach is accepted (despite the common influence of collectivism). This sub
section reveals a story of an individualistic approach that does not consider communal input, so is described as an *'I factor'* as opposed to a *'we factor'*. 

As a Melanesian society, Papua New Guineans have an affirmative culture of belongingness and sharing of resources that is often referred to as the *wantok system* as described in Section 7.5.2. Even the principle of Christianity affirms the culture of sharing and caring that lures people so much to dependency on others and reciprocity. Whatever is communal is shared and contributed by everyone in the community including church activities, maintaining school grounds, managing the aid post and so on. Despite this common culture of collectivism or the *'we factor'* being practised, there remain other cultural differences and practices between societies. People are expected to look after themselves and their immediate family in terms of individual advancement in business, labour support, building their own house, making a garden and growing food, fencing, and some other activities. As one interviewee commented:

‘One of our customs is that; say if you are to build a house, no one will help you. You will have to build the house yourself unless someone feels sorry for you to help. Even in gardening, you have to do yourself. If you are good to others, they may be willing to help. The culture here is you do things yourself to survive, a way to show that you are strong in the community and to be independent. But now-a-days some are paying for labourers for assistance unlike before'.

It is their culture that all basic survival tasks are to be done individually, to show the rest of the community that the person is strong and fit to survive and can support the community in general communal activities. There is an admiration of the strong. Seeking help or assistance is seen to represent weak status in a society and so bringing this culture of *'I factor'* to some extent in a modern society is the opposite to the Tolai society of the *'we'* principle. Generally, the people in Wampar can advance in certain businesses without much fear of superstitions or *'puripuri'* as opposed to some other societies, for example in the case of the Tolai as described in section 7.5.3

### 7.5.5 Attitudes toward Time Use (Polychronic Culture)

The other culture commonly practised by the Tolai and Wampar people is that they are not responsive to time pressures. Time seems to be always available. The general finding was that one is never too busy, and it is not necessary to finish one activity before starting another. People are *polychronic* - that is, people take a more leisurely view of time, time is cyclical and interruptions are unimportant. On the other hand *monochronic* cultures tend to work and respond to time as is common in Western or European societies.
Time is not an issue to the Tolai and Wampar people; they adjust their activities to available time to suit their needs. Farmers also revealed that they spend a considerable amount of their time on other activities rather than farming. As one smallholder farmer suggested:

‘I spend a lot of time in our Ward doing council work and I don’t spend enough time in cocoa or farming work or with family’.

And another:

‘I am a farmer, but I think I am spending more time with church work. I am currently helping the carpenters to build our new church because all blessing comes from God and it is rightful to support church work’.

Farmers are involved in multiple activities at one time and tasks are often incomplete and most activities are delayed. For example, critical tasks in maintaining their cocoa block such as cocoa pods harvesting or weeding are not attended to when there is a death in the village, as whole community members’ presence and participation in the funeral is expected and normal daily activities cease for around a week at that time. This affects the health of the crop thus affecting the yield. Farmers in all study areas were more flexible about time; they have no problem integrating farming activities with socio-cultural and emotional tasks. It seems that maintaining relationships and socialising are more important to them than accomplishing tasks.

7.6 KINSHIP AND LAND TENURE

Kinship and social relationships form an important part of the lives of people in most societies including the Tolai and Wampar societies. The Tolai people inherit land through matrilineal lineage while the Wampar inherit through a patrilineal system. This subsection presents the Tolai kinship and land tenure practices and later proceeds on to the Wampar practices to explain the importance of this system.

7.6.1 The Tolai Way

For Tolai, their identity is not just a matter of their distinctiveness as an ethnic group or wantoks; it also covers kinship and land. The Tolai population is divided into two moieties; ‘Marmar’ and ‘Pikalaba’ (Fingleton, 1985). This is a division of people for marriage purposes. A ‘Marmar’ person must marry a ‘Pikalaba’ or vice versa (Fingleton, 1985). The two moieties are dispersed across the Tolai territory, and no Tolai villager is in any doubt as to who in the local community belongs to his or her moiety, and who belongs to the other. This moiety division is critical to the Tolai social organisation and is an underlying factor in all matters affecting access to land.
The central corporate unit in Tolai society is the clan, the group of people who trace their matrilineal descent from a single female ancestor. As a matrilineal society, Tolai are members of their mother’s lineage. An individual acquires membership of a clan from his or her mother, and from this comes their place in Tolai society and their main avenue for accessing land. Tolais may gain access to land by other well-established customary ways, but their most secure tenure is in the land of their own clan (mother’s side). Not all Tolai men agree with the matrilineal lineage of land tenure and seek to purchase private land or blocks away from the main village so as to have rights on their purchase land rather than the customary land (belonging to women). This is illustrated by the response from one smallholder farmer:

‘In my original village [Kokopo] according to culture the sons do not inherit the land. In our Tolai traditional culture, the clan and the women decide whom to inherent the land. I cannot give my land to my children, as it is against the Tolai custom. I have to give it (land) to my nieces and nephew. My sister’s children will inherit the land and my own children will not get any land. However, in the current land that we have now settled is a land that was bought from the Bainings so our custom does not apply, therefore if I die the land belongs to my children’.

Due to the matrilineal lineage of the land tenure system, most men are reluctant to invest in or develop the customary land that, in the event they become deceased; it will belong to their sisters and not their children:

‘Land is important to me and our lives depend on the land. Here [purchased land] my children can inherit my land. However back in my original village, if I want to do something on the land, I would think twice that it won’t be my children who will benefit but my niece and nephews’.

Although most Vudal and Burit people now live on leased land or land that is bought from the government and/or landowners, the influence of matrilineal land kinship is eminent.

7.6.2 The Wampar Way

Unlike the Tolai people, the Wampar people own most of the land through patrilineal lineage. With regard to kinship; the Gabsongkeg and Wampup people practice agnatic kinship in which an individual is identified with his or her father’s lineage so their kin groups are patrilineal. In terms of inheritance of land, it is the male children who have the right over family land, unless there is no son in the family and then the daughter (unmarried) may inherit the family land.

Lineages claim areas where their ancestors settled when they came to the Lower Markham Valley. Later during the colonial era, the Australian Administration claimed some of these lands belonging to the Geaganson and Orognaron tribes for agricultural usage, especially for cattle farming. Some of these lands were leased and later purchased by entrepreneurs, mostly
foreigners who farmed those lands until prior to country’s independence in 1975 when most of these lands were sold back to the State or to local indigenous farming cooperatives.

The land currently occupied by the Gabsongkeg and Wampup villagers, is owned by a few family members belonging to Geaganson and Orognaron clan. Associates, friends and helpers who are associated with the lineages (Geaganson and Orognaron families) were given a temporary portion of land. This group of people have been allocated less than two hectares of land per family for gardening, but are not allowed to grow cash crops like cocoa (until and unless permission is sorted from legitimate owners) because these lands have been designated for future use by themselves or possible investors. The lineages are wary of the potential costs, confrontations, conflicts, and time consuming claims for compensation that would arise if cash crops had to be removed. Settlers (both local and outsiders) are seen as caretakers unless and until the land occupied was rightfully purchased and is recognised by the landowners and the courts. One farmer interviewee commented:

‘Some of us who are here are from another clan, we originally come from Zimbazing near 40 Mile. Our ancestors came from the mountains and settled there. There were some original landowners of 40 Mile as well who were living there prior to our ancestors’ settlement and they are legitimate landowners by rights in our tradition. However, through intermarriage or helping in warfare or barter systems they have enhanced the relationship and friendship with the original landowners so land was given to settlers like my forefathers. Likewise, here the original landowners have legitimate rights over this community land (Gabsongkeg) and they decide whom to give. They belong to these two tribes called Geaganson and Orognaron. We do not have full authority over the portion of land we are currently using as my father came here through intermarriage. Unfortunately, my father was out of the village all his years working in other provinces so all available land was occupied by his brothers and other relatives. When we returned after my father’s retirement, there were no adequate land for us so we are settling on the roadside allocated to us by our uncle....It limits my dream of doing any long term usage of any land because we will be confronted by the legitimate land owners. It suppresses me and my brothers from venturing into big things like planting more cocoa trees or building a permanent house etc. unless we buy our own land’.

Box 7:2 Story of land tenure and kinships in Gabsongkeg and Wampup villages.

Land disputes have become more common especially among Gabsongkeg original landowners and non-Gabsongkeg working on Gabsongkeg land, or non-Gabsongkeg who have settled in after purchasing a portion of land from the landowners. Nevertheless, the Wampup villagers are not keen on selling their land and do not have many land issues, however if they were planting cash crops or extending their boundaries they would seek permission from the principal landowner. Traditionally, sons received land from their fathers and daughters worked in their husbands’ gardens. In recent times, with increasing interethnic marriages, this system has changed, where a daughter can bring her husband (outsider) to her father’s land. One of the issues raised by the people living in Gabsongkeg village is that some of their relatives are selling prime land to non-Wampar families or people from other provinces and that creates tension with the locals due to different ethnic and cultural backgrounds, as two local villagers commented:
... the biggest problem here is a lot of people (land owners) are selling their land and there are a lot of disputes on the land between the settlers and the landowners and between the settlers and the community. Example, disputes over the land boundaries.

and

If you drive around the area of Gabsongkeg and further up the road you will see a lot of settlers from outside the province... There are all sorts of people living here now. We used to have a reserve land on the other side that is now occupied by the settlers. These lands were sold to them. We call it PNG block, all races of Papua New Guineans are living there. Tolai, Sepik, Samarai you name it.

Although many community members are against the sales of land, there are some who cannot resist when cash is offered:

... people (land owners) are selling their land to outsiders and these settlers have brought in a lot of people. Some of our people are plain lazy and selling land to make easy money.

7.7 ORGANISATION OF LABOUR IN THE HOUSEHOLD

Labour organisation in Wampup, Gabsongkeg, Vudal and Burit farming families is vitally important because it is an influencing factor in determining the type of livelihood strategies adopted by the people in those villages. It is important to have an understanding of the choices of occupation based on gender, work and the life cycle of the household, and the allocation of time between work and leisure in order to see where cocoa work comes in. How labour is organised by the households of these four villages is an important influencing factor in the livelihood strategies of the people living there.

Households in these four villages are composed of one or more nuclear families, sometimes including foster children or workers from other ethnic groups. Most households are composed of several houses, including separate sleeping houses for nuclear families, a cooking (kitchen) house, and a bachelors' house (haus boi). The average household size is six in all villages. Aspects like living, cooking, eating, communication, and working together are criteria that make the household an important social unit. Most villagers in these regions are full time farmers doing farming activities (production, management, marketing) to sustain themselves, while a few are employed by companies or government and spend most of their time doing paid jobs and only weekends in farming activities or other obligations.

Choice of occupation varies with the task. In general, there was a clear-cut division of labour along gender lines. Broadly speaking, ‘heavy’ work such as clearing a site for gardening, building a house, pruning cocoa trees, planting certain crops, hunting or fishing is all the responsibility of
the men. Women (including daughters) do ‘lighter’ activities such as planting, weeding, and harvesting certain crops, selling farm produce in the markets, collecting firewood, looking after small animals, child care, household upkeep, and daily household chores. However, there are some taboos in planting certain crops with restrictions as in taro. A smallholder farmer from Gabsongkeg commented:

‘... Yes, in planting taro and yam women are not allowed, only men. If women plant taro, then it will not bear good tubers. Other than taro and yams, both men and women plant all other crops’.

Nevertheless, it was observed in all four villages and other places that crossover in the performance of tasks was becoming common. Unlike the tradition of gender based roles mentioned above, men, for instance, are increasingly being observed assisting women to care for children and likewise women are being increasingly observed assisting men in garden related activities. While in the past child rearing was a female task, it is now more common for both parents to share the responsibilities to raise and discipline their children.

In addition to spending more time on activities traditionally the responsibility of women, farmers also revealed that they spend a considerable amount of their time in other non and/or off farming activities including community work, custom activities, church activities, and other businesses, reducing the time available to attend to food crops and cocoa gardens. The following comments are typical of many smallholder farmers:

‘I spend a lot of time in our Ward doing council work and I don’t spend enough time in cocoa or farming work or with family’.

and

‘I think I am spending more time with church work. I am currently helping the carpenters to build our new church because all blessing comes from God and it is rightful to support church work’.

and

‘I am interested in sawmilling simply because there is very good income from timber so I spend more time in sawmilling. Cocoa is okay, but after the experience of CPB I am reluctant to concentrate on cocoa again’.

The pattern of the choice of occupational activities can also impact on other family members. Where certain tasks remain incomplete, tension can build within a family, especially with the wife, often leading to family disputes, as one farmer’s wife noted:
'He [referring to her husband] gives burden to the family, gets up and goes, come back sleep and then go out again in the morning. He spends a lot of time for other people, and I often ask him; “when will you have time for your family”? The children being a mother burden me and I take full responsibility for the children, I do gardening, I cook for them, etc. One of our dreams is for our children to get a good education. I tell him, you work day in day out, when will you concentrate in our cocoa block so you can support the family’. Often labour availability is limited as people do multiple activities at one time. Efficient utilisation of scarce labour is paramount in the livelihood of a farmer in any rural setting. Often it is difficult to get help from other community members unless they are remunerated so the family unit needs to work hard themselves.

7.8 THE VILLAGE ECONOMY

In this section, a synopsis is presented on the economic settings of the four study villages. The economic aspects of all the studied communities are described because the livelihood system of these villagers, in terms of decision-making, revolve not only on socio-cultural aspects but also on economic factors as well. The village economy aspects presented are; household income, expenditure and savings, exchange and distribution, and the Tolai currency.

7.8.1 Household Income

Most households within the four study villages have some form of an unwritten budget. In most instances, the head of the house controls the budget. Often there is collusion between the married couple regarding household budgetary matters and the pooling of income. However, there is a tendency that men make decisions on money obtained from cash crops like cocoa or activities of higher income like sawmilling, while women often have the responsibility to decide on expenditure from lesser income activities, for example from the sale of garden products, as the following interviewee comments capture:

'I make most decisions, but my wife contributes at times. But in all cases I make the decision for the family. With the money I would make decisions on income from cocoa, but leave the rest to my wife’.

and

'My wife makes decision on whatever money we earn from the sales of produce from our garden, however money from sawmilling and cocoa I make decisions’.

and

'My wife is a creative woman, especially managing our finances well’.
Adult children who earn income through their own toil or through gifts usually keep their income and do not necessarily contribute to the family budget. There are various income sources for the household. The majority of the income is earned through farming activities, especially through cocoa production, followed by the marketing of garden produce (greens, vegetables, taro, sweet potato, peanut, fruits and nuts, etc.), coconut, chicken, and fishing (farmers in north Vudal). Market attendance was one of the most important and regular activities a woman would carry out daily to provide income.

Plate 7.3 Farmer husking matured cocoa pods for wet-bean sales

Plate 7.4 Women selling garden produce near road market
One of the significant cash crops grown in all four villages is betel nut and betel pepper (see Plate 8.3) as betel nut is widely chewed throughout the country. In fact, the Wampup and Gabsongkeg household economy depended entirely on betel nut until its destruction in 2000 by betel nut weevil and people were devastated (see Box 8.3). Comments from one smallholder farmer reflect this situation:

‘In 2005 all betel nut trees were fully destroyed and people really suffered, no more happiness, no movement of people, so people started to attend to garden. People in this community relied on betel nut for their survival and when the crop destroyed, people were devastated. So people were looking for alternative cash crop and identified cocoa as a crop to go for’.

Small scale chicken farming (50 birds) and sales within the village or main markets are common in all study villages although some farmers in Gabsongkeg village do commercial chicken farming. The Wampup villagers on the other hand raise cattle and sell them at open markets after 2 – 3 years. In fact, the animals are assets for the farmers that can be exchanged for money anytime when an urgent need arises.

Apart from farming, some villagers earn their living from off-farming activities like casual employment, sawmilling, trucking, and trade store (details explained in Section 8.3.3 on livelihood activities). Trucking or transport related business for carrying produce and passengers (paid motor vehicle- PMV) is also quite a popular means of off-farm activity that brings in revenue to some families, but is considered to be risky. Household income is also generated through non-farming activities by gathering bush materials (for building houses) and selling, and making and selling of mats and baskets (see Plate 7.5) from coconut leaves.
Occasionally family members and relatives in formal employment in other towns and cities in the country or abroad send remittances to the village. The actual figure of income per household could not be established, since most farmers would not divulge such personal information, but it was obvious that they earn sufficient income through farm produce to meet their daily needs, supported as well by other means. Thus we can surmise from the above that farmers and their families diversify into many livelihood activities to make a living but their core income is through farming activities in general.

7.8.2 Expenditure and Savings

The income earned by households in the four study villages is spent on various items, dictated largely by needs but also by social obligations. Although expenditure patterns vary between households, money obtained from cocoa, sales of fresh produce, etc. as described in Section 7.8.1 is rarely saved and/or re-invested into those income-generating activities. Saving money becomes challenging due to the increasing costs of goods and services and short-term needs and wants. Revenue from the sales of cash and food crops is often spent on imported food (rice, tinned fish, flour, sugar, tea, salts, lamp flaps) bought from Chinese shops in town (Kokopo and Lae). When asked what he does with his earnings, a farmer responded:

‘We grow cocoa and food crops to sell in local markets to earn income to buy the necessities like sugar, salt, soap, cooking oil etc’.

They also spend money on non-food items. These include transport, toiletries, kerosene, garden tools, clothes, mosquito nets, cutlery and other little items. Money is also spent on wantoks (relatives) and social obligations such as church contributions, funeral feasts, taboos, marriage, and/or compensation payments. The story of a Tolai farmer in Box 7:3 sheds some light on the expenses associated with customary obligations, which is a typical scenario of both the Wampar and Tolai people.
When asked about his culture and customs, the farmer explains:

‘Culture and customs is part of our life in our society. It was passed on from generations and it is important to us. Although customs are important, in my opinion, it is a burden to us as it costs us a lot of time and money to do cultural activities, [and] we make losses. I am against many of the customs, but I cannot let go because, our ancestors have put this in place and it becomes a ritual in our society. If we do not follow it, [customs] then we will be rejected from the Tolai society. It is not normal for a Tolai to ignore customs. However, culture and customs sometimes become a burden to me and my family. When I do not have anything to contribute to cultural obligations, then it puts the burden and shame on my family so I have to go and seek help from my brothers or sisters to help me with money so that I can participate.

For example, if we have a death, say if my brother passes away. Now my family and I are living in the block and we do not have a cemetery here so I have to take my brother’s body back to our original village cemetery for burial. Therefore, I have to hire a truck. For one hire is say, K200. As a culture all extended families in the block will have to witness the burial, I have to hire 2 to 4 trucks. I have to find money somehow and that would be a huge burden for my family and me. On top of that, after the burial, we have to make a feast to end the funeral [haus krai] so we have to buy food in the shops, buy bananas, a pig and on top of that we have to give shell money, bags of rice, live pigs to the people that have been with us mourning since the death. These things are a lot of burden and set us back. Therefore, these are some of the traditions that we waste money [on] and I do not like. However, this is life and as part of a society, we have to uphold such traditions and cultures.

Another example is paying bride price; yes, in the past say the 80’s in East New Britain, we use to pay 150-param ‘tambu’ [shell money] only as it was the main bride-price as accepted by custom. However, today it is different, when you pay bride-price, you have to give 300-param tambu, and they [bride’s relatives] will charge you additional K1500 – K3000. That is what I mean,... it is very expensive. Such are some of the things that are making our lives harder and difficult. I for one think that we should not pay bride-price; people should marry freely than paying bride-price to the bride’s relatives. I pay bride-price and then I have to raise the kids and I do not get it. After all, I have my family to feed and raise my children and can’t always commit to such unnecessary bride-price customs. So what I am saying is of my view.. (pause).. life is hard’.

Box 7:3 A farmer’s story of costly customary obligations

The frequency of expenditure on both food and non-food items is irregular, based on availability of income and needs. Upon the meeting of daily increased pricing of consumable needs and other costs mentioned above, one farmer commented:

‘What I earn from cocoa or other crops goes into buying tambu, school fees, clothes, and household needs, we spend all our income. We hardly invest back to cocoa because we are faced with many needs’.

Meanwhile an extension officer offered a slightly different perspective:

‘In my view it has a lot to do with culture as well, social way of doing things ha,... but also as I have said farmers do not treat cocoa farm as a business, do you know, they don’t have plans, they do not put money away to fund the inputs back into the blocks like fertilizer, chemicals, planting materials for replanting’.

The spending of most households in the four study areas is based on short-term needs and there is no clear focus on long-term strategies, or investing back into the farm. However, there is
considerable desire for building permanent houses and seeing their children getting a good education.

‘I want to own a permanent home to improve our lives... meet my children’s school fees and to sustain my family’.

It can surmised from the above that households in all study areas lack awareness of serious saving and the importance of reinvesting into the farming activities. Most of their earnings are spent on short-term needs and customary obligations.

7.8.3 Exchange and Distribution

A central feature in the social, economic, and political life of the Tolai, Wampar and Melanesian culture in general is the concept of exchange of goods and services with others for return favours or for money. Some of these exchanges involve the visual display of wealth.

Culturally such exchanges establish peace between clans and/or display status within and outside the clan. In fact, exchange creates a pattern of distribution of the income and output among individuals or community obligations through reciprocation. The pattern and degree of distribution of income varies from society to society as it has its roots in the culture, including the wantok system, and is fundamental to sustaining their livelihood.

The traditional Wampar and Tolai economy is a self-sufficient unit where both formal and informal exchanges took place, although things may have blended with the Western way of doing things in recent times. Such formal exchanges include marriage ceremonies and exchange of women, mortuary feasts, church openings and celebrations such as Christmas, New Year and Independence Day (modern). Feasting and dancing are common events in these ceremonies. Often this distribution implied a reciprocal obligation on the part of the recipients to pay back on some future occasion as much or more than the amount received. For example, the ‘bananas exchange’ ceremony of Wampar, and the ‘tabu’ or ‘tambu’ exchange (shell money) of the Tolais. These are occasions during which huge quantities of banana bunches in the case of Wampar, or ‘tabu’ for Tolai, are given away to associate clans in exchange for pigs, money or a strong alliance. Even in the case of relatively small-scale gift giving there is reciprocal obligation, with individuals expecting to be better off materially or in terms of status. Some exchanges are voluntary, but exchange creates a pattern of distribution of income and output among individuals or societies. For instance, a farmer and his family may request the youths in the
community to harvest cocoa pods and the farmer and his family prepares large meals for them in return. Other informal exchanges include visits of relatives and friends. Such visits may sometimes involve presentations of gifts, but the main purpose is the renewal of acquaintances and strengthening of bonds and relationships.

In terms of land matters, the Tolai women have the legitimate authority in distributing land among the children under matrilineal culture but the men, as head of the family in most cases, may distribute income to the family members.

7.8.4 Marriage and Bride Price

Marriage ceremonies are another ritual involving exchanging of goods and services. Mostly marriages are arranged for reasons that include social standing, family ties and needs, economic purposes, and as part of tribal customs. According to traditions of both Tolai and Wampar people, the couples must be attractive and industrious. The bride price is a marriage custom that is widely practised in certain provinces in Papua New Guinea. The prospective husband’s family makes a payment to the bride’s family. The parents and relatives of the groom normally pay a form of bride price in the form of goods, pigs and cash to the bride’s family, thereby solidifying their marriage through a symbolic exchange which strengthens clan ties and in so doing, serves as a social contract and an equalising factor for both parties.

The bride price ceremonies and exchanges of the Tolai people are quite similar to that of the Wampar. Box 7:4 presents the marriage and social organisation of the people of Wampup and Gabsongkeg area (Wampar) and their significance.

The Wampup and Gabsongkeg farmers explained that their culture is important to them for describing their identity. The culture surrounding marriage arrangement is one factor shaping identity. In marriage, by tradition, it is accepted that to have an ‘exchange marriage’ is to create a close bond between two lineages. For example, a sister of the bride will in return marry the brother of the groom. Though this type of arrangement is not as common as it once was, it remains an important factor in developing and maintaining relationships. In most cases, the parents will arrange marriages, but the consent of the partners may also be required. The groom’s family pays a bride price in a form of goods like pigs, coconuts, bananas and money to the bride.

Today young people meet their partners at high school or in town. Other more ‘modern’ techniques of finding partners like mobile phones and internet services are also increasing used. Interethnic marriages have become more common in recent times. Polygamy, whilst common in years gone by, is quite rare today due to the increased cost of living and costs of raising a big family. It is also considered to be against Christian teachings.

Box 7:4 Explaining marriage of Wampar people
7.8.5 The Tolai currency (Tambu)

The Tolai society is unique in Papua New Guinea (PNG) as it has its own traditional currency apart from the modern money, and it is recognised by the Bank of PNG. Therefore, this sub-section describes the Tolai economy in terms of monetisation and the currency used (Tambu), household income, expenditure, savings, exchange and distribution patterns throughout the East New Britain Province (ENBP), especially with respect to the people of Vudal and Burit.

The ‘kina’ and ‘toea’ (PGK) is the national currency of Papua New Guinea (PNG). Alongside that, the Tolai people of East New Britain Province use ‘tambu’ (shell money) as an alternative medium of exchange still highly valued as a currency by the Tolai society. ‘Tambu’ (sometimes-called ‘tabu’) is made of small rock snail shells. Plate 7.6 is a picture of tambu coiled.

Plate 7.6 Picture of Tambu threaded on to rope and coiled

To facilitate the transaction of the Tambu in main markets, the government has set up a special bank solely for the conversion and management of Tambu in the province. In 2001, the East New Britain Provincial Government accepted the payment of taxes and local Court award restitution and settlement of disputes in ‘tambu’. In 2002 a Tolai Exchange Bank commenced exchanging tambu into PNG currency at the rate of 4 Kina (K4.00) per param (approx. 300 shells). Circulation of shell money (tambu) then had an estimated value of K8 million (Maxell, 2012 ?). Some goods and services are obtained through the exchange of tambu as described in Box 7.5.
Tambu is used in transactions at local commodity markets as well as for services between members of the Tolai community apart from modern money (PGK). For example, an owner of a coconut block may accept tambu in exchange for that person to collect a certain quantity of coconuts as per the agreed amount of tambu from his block. Alternatively, a person can pay tambu for the hire of labourers to do one’s work or to pay the price for a bride. Some uses of tambu were revealed through the interviews:

“Yes... we [referring to Tolai people] have a unique culture in exchange for goods and services. We have two mediums of exchange, money (PGK) and shell money [tambu]. Ok... to sustain our well-being, we are more reliant on these two mediums of money. Most village people have [more] shell money (tambu) available than modern money. When we need something for the house or when we do not have money (PGK) to pay for children’s school fees, then we use tambu to buy goods or pay for school fees. Alternatively, we would go and see other block owners and exchange our shell money (tambu) with them to harvest their cocoa or coconut for copra and sell in return. The number of tambu paid depends on the size of the block, if it is more than a 100 coconut trees than it is a big block. I would pay about 20 param (equivalent to PGK80) to the block owner for him to allow me to harvest cocoa or coconut from his block. We sustain our lives and the economy of the Tolai society by relying on two mediums of exchange unlike other provinces’.

and

“For our daughters, we receive tambu (shell money) from the bridegroom, but for our sons we have to pay tambu to the bride’s parents and relatives so we have to work hard and save money to buy tambu.... I can also buy food crops like banana, peanut, taro or fruits with tambu in the markets... I would accept tambu as it is a form of cash money in Tolai custom’.

Not every rural household in Burit or Vudal has adequate or readily available cash (PGK) to buy goods and services. The Tolai people use alternative currency, the tambu, that is readily and easily obtained by most families in the community enabling them to buy or exchange with other goods and services.

Box 7:5 Example of the use of ‘tambu’ for currency and exchange by the Tolai society

The influence of the usage of both modern money (kina and toea) and traditional shell money (tambu) to the Tolai village economy is evident in just about every aspect of Tolai society including Vudal and Burit villages. It has transformed economic, social and political organizations and relations.

7.9 CHAPTER SUMMARY

This chapter established the understanding of the study area’s history, the village economy and social organisation. It began by outlining the pattern of human settlement in the study areas, then their social organisation, and finally the village economy. The human settings varied between the two provinces and within the study sites of the province as well. People from the study sites originally migrated into their current locations. The Tolai and Wampar people have unique cultures and traditions that govern them but with some things in common. The nature of their settings and culture determines much of their mindset and the pattern of village economy and social organisation. Moreover, the Tolai are well established and even developed their own traditional Tolai currency called ‘Tambu’ and have an entrepreneurial mindset in
nature. Despite their ingenuity and innovative mindset, they still faced resistance with cultural and political setbacks. The Wampar group on the other hand, are less innovative in nature.

The Wampar are a patrilineal society and own large portions of land unlike the Tolai people (except the Baining). Most Tolais indicated that land tenure issues were eminent under the matrilineal kinship and they would prefer patrilineal kinship so as to give the father the right to distribute land to his children. The needs of an ever-growing population is putting pressure on the Tolai system of customary land tenure. Therefore, land shortage is a major issue faced by the Tolais. On the other hand, the Wampars have vast lands that are idle apart from ranging a few cattle. It indicates that Tolais with a small portion of land utilised their land better than the Wampars with vast land.

In all study sites, most households rely on family labour for farming and non-farming activities. Generally the Tolais tend to work in groups (we factor-collectivism) while the Wampars were more into individualistic behaviour (I factor-individualism). The pattern of the choice of occupation varies with the task. Relatively, there were clear-cut divisions of labour along gender lines, however there are some duties that are shared. The farmers in the study areas do multiple activities to make a living and fulfil their cultural and community obligations, but farming is the core activity for all. Food crops are grown for consumption and market. The common cash crops grown are cocoa, coconut and betel nut. In fact, betel nut was the only cash crop grown by the Wampar in the past, but after its destruction, people focused on cocoa and food crops.

Some of the major community concerns and problems raised were stealing, misbehaviour by youths resulting from alcohol and marijuana abuse, family violence, land disputes, and lack of government services to enhance and support farmers’ livelihoods.

From the details above, it is clear there are many things that are just as important to the people as cocoa. Their livelihood is associated with a number of factors including the setting of their villages, demographic characteristics, political organisation, socio-cultural beliefs, and the village economy. That is why it is important to understand these factors and see where cocoa fits in.

The next chapter further describes livelihood strategies or activities and their impact on farmers’ choices in the study areas (Vudal, Burit, Wampup, and Gabsongkeg).
CHAPTER EIGHT: ASSETS AND LIVELIHOOD STRATEGIES

The previous chapter provided a descriptive understanding of the Tolai and Wampar history of settlement, village settings and socio-cultural and economic organisations. Such descriptive analysis provides a pathway to investigating the availability of assets that affect the livelihood patterns and strategies undertaken by the farmers in the study areas. This chapter describes the influence that different types of assets have on the livelihood strategies of farmers participating in this study. In revealing and discussing these influences, a thematic analysis of the semi-structured interview data is presented.

8.1 INTRODUCTION

This chapter is presented in five main sections with two appendices. The availability and accessibility of capital assets and their influence on farmers’ choices in maintaining certain livelihood activities is described in Section 8.2. The livelihood strategies or activities undertaken by the Tolai and Wampar households are outlined and described in Section 8.3 and further collated and described in Appendix 8.1 and 8.2. The constraints in cocoa production is presented in Section 8.4 and the effect of vulnerability on farmers’ choices in undertaking certain livelihood activities is presented in Section 8.5, and livelihood outcomes are described in Section 8.6. The chapter concludes with a summary at the end in Section 8.7.

8.2 LIVELIHOOD ASSETS

An individual farmer’s livelihood can be strongly influenced by the types of assets available and accessible to them. The types of assets proposed within the agricultural based sustainable livelihood framework (see Figure 6.1) include natural, infrastructural (physical), human, socio-cultural and financial. Farmers have combined these assets in many different ways to generate positive livelihood outcomes. A summary of the assets identified in this study are described as follows.

8.2.1 Natural

The Tolai and Wampar villagers have a deep connection to their natural environment as they derive all or part of their livelihood from resource-based activities (farming, fishing, gathering in forests, and so on.). The natural environment across all study sites comprises the land, rivers,
sea (for North Vudal), mountains (for Burit), valleys (for Wampup and Gabsongkeg), the air space, and the associated goods and services such assets provide. Vudal and Burit areas of East New Britain Province (ENBP) have variations in rainfall, landscapes, soil type, water sources, and vegetation in Wampup and Gabsongkeg areas of Morobe Province, and so farmers have adapted various farming system practices according to local conditions and the specificities of their local knowledge. Such variation has less impact on the type of crops grown and consequently cash crops such as cocoa, coconut, vanilla and betel nut, along with common food crops of the same type are grown equally well in both provinces.

A farmer assesses his environment according to his experiences and local knowledge to plant certain crops in certain places at a certain time of the year, including the patterns of crop rotation or bush fallow. Although agricultural activities take much of their time, rural livelihoods are also highly dependent on common community natural resources. For example, the kunai grass plains in the Gabsongkeg and Wampup villages are used for hunting grass possum and bandicoots; the sea and mangrove vegetation in Vudal are used for fishing, collecting shells, and gathering sago palm leaves for making mats and roof thatches, while the forest in Burit village is used for sawmilling timber for housing purposes. These natural resources are accessible and open to respective community members. Having such natural resources and given certain traditional customary rights to access these resources provides opportunities for the households to diversify livelihood activities (farming, fishing, sawmilling, making baskets and mats, hunting, and marketing) to meet their livelihood outcomes (survive, improve their living standard, minimises risks and so on).

To the Tolai and Wampar (and other PNG societies), land is considered ultimately important to the point that it defines their very existence. Indeed, each member of the community owns a piece of land in the community, as one farmer interviewee highlighted:

‘... land is important to me and our lives depend on land’.

It is through land disputes that tribal wars can be triggered, so communities have strategies and traditional laws and rights relating to land kinship. Even if a family member has been away from the village for many years, his piece of land will still be reserved by his family members. Once he returns he would resettle. His relatives may cultivate his land (with permission) to make gardens and the like, but when he returns the relatives will abandon the land to make way for him. The farmers living in Wampup region own relatively vast amounts of land from 10 to 400 hectares per household while farmers in the Gabsongkeg region own land from one to 40
hectares. These two villages are exceptional in comparison to the rest of the farmers in the country who generally own 0.5 to 2 hectares (Lipton, 2004; World Bank, 2007). The farmers of Burit and Vudal typically have a block of land less than two hectares, except for the indigenous land owners (Baining) of Burit village who mostly own vast hectares of unoccupied land and forests. Due to increases in population and prices of goods and services, considerable pressure has been placed on land usage to the point that some people have sold their extra land.

Farmers across most regions are aware of the impacts of land pressure. All the land of Vudal and Burit villages (excluding indigenous Baining), for instance, is exposed to issues associated with diminishing land availability, as the following quotes from interviews reflect:

‘One problem is we don’t own enough land’.
and

‘The other issue is the land problem, we can’t do much on the land we are currently on’.
and

‘Land shortage is an issue...most parents are not searching to buy more land for their children’.

Wampup and Markham valley people are among the few communities of people in the country who have vast fertile farming land, yet it largely remains idle. Meanwhile, farmers in the Gabsongkeg village on average have sufficient land but the trend of selling a portion of their land to outsiders might not only create future land shortages but may expose the community to other socio-cultural issues due to new land holders having a different ethnical background (for example; culture, traditions, customs, and beliefs). This perspective was captured most typically by remarks from two farmers from Gabsongkeg village:

‘There are all sorts of people living here now. We use to have a reserve land on the other side [but it ] is now occupied by the settlers. These lands were sold to them. We call it PNG block, all race of Papua New Guineans are living there... Tolai, Sepik, Samarai you name it’.

and

‘One of the main concerns and a problem is the settlers who are living on the land that been sold are causing a lot of conflicts with our community’.

Appropriate utilisation of the above natural assets requires a proper and well imbedded infrastructure. The next section deliberates more on infrastructural or physical assets.
8.2.2 Infrastructure

Infrastructure has an important influence on the livelihood of the people in the study areas. Basic components of the infrastructure required for sustainable livelihoods include reliable roads, electricity, health centres, schools, water supplies and sanitation, communication, extension services, markets, and other government services. Across the study regions, the types and availability of different infrastructure varied.

8.2.2.1 Roads, electricity and sanitations

The Vudal village surrounds the University of Natural Resources and Environment (UNRE) campus and a main road passes through the village. Due to its strategic location most parts of the village along the main road (Vudal-Keravat) have electricity that are branched out to houses in the village from the power poles running along the main road to UNRE. Electricity is provided by PNG Power, a State own entity. Community members in these locations also have affordable, reliable paid transport, especially buses, and utilities that transport people and market produce such as cocoa or copra to the main market and depot in Kokopo City.

Plate 8.1 Main road from Vudal to Kokopo Town

Burit village also has a good road network that runs through the village (although feeder roads are poor) which enables villagers to transport their produce to the main markets in Keravat or Kokopo City as well. There was a construction underway to upgrade the existing road to a highway (New Britain Highway) linking East New Britain (ENB) with West New Britain Province.
(WNBP). The Government believes that the highway would make a large contribution to the oil palm industry to extend from WNBP to ENBP and while it may provide the opportunity for the ENB farmers to diversify into oil palm growing, views about such an opportunity could be quite strong:

'I would not comment on oil palm because I do not know anything about oil palm, I was born and raised with cocoa and coconut so would stick to these two so I do not know.

and

'In the past when I was working in West New Britain in 1972, I experienced the work involved in oil palm which is very hard and will destroy us. I for one hate this crop because it's hard work in harvesting, transport the fruits by wheelbarrow, into the net .... its hard work. So in East New Britain we don't want oil palm'.

Furthermore, ENBP is known for earthquakes and volcanic eruptions, so the highway is seen by some as an important evacuation route. However, while transport links might ordinarily be considered a major benefit for a community, the villagers within the Burit community and people living further up the mountains have their own views. As a village leader explained in response to a question about the perceived benefits of the highway, some community members are fearful of the impacts of increased access to their regions:

'The obvious change in the community is the road to the village. I see that road is the lifeline of the people. In the past when there was no road, I used to walk long distances. Now with the access of road it is easier to travel. The road makes it easier for people to sell their produce, unlike before life was hard for us (paused)... I have told the people in the village who were living far from the main road to move closer to the road for easy access to services. However, many people have complained about the road saying it will bring problems, but I have always mentioned to them the benefits of the road... (Pausing) with better roads, there is less death in the villages because we can travel to the hospital faster. Now it is easier to sell our produce instead of walking long distance to market. The people in the community are complaining that the accessibility of the road will bring in outside influence and the road network will bring in outsiders that may cause trouble in the community'.

Wampup and Gabsongkeg villages of Morobe Province are near the main Highlands Highway (although Wampup is a kilometre in) and Trukai Rice sometimes maintains their feeder roads.

There is no electricity supply to the village (Burit), therefore hurricane lamps are mainly used as a source of light, although one or two people in the village own small electric generators that supply electricity for use in their trade stores and for church meetings. In spite of the absence of electricity, farmers in both Burit and Vudal have access to the health centre, schools, and communication services (mainly mobile phone usage). Two major communication companies (Bmobile and Digicel) in PNG provide mobile phone network services.
Water supply and sanitation is another essential service for people’s health and wellbeing. Despite its importance, there is no proper water supply and/or sanitation across all study site villages. Rainwater is captured from the gutters and stored in tanks for drinking and cooking purposes, while water from wells and streams is used for bathing and laundry. Wampup and Gabsongkeg villages sometimes encounter long dry seasons between May to August and experience water shortage, however the water tables of their respective wells rarely dry up (except during the EL Nino drought in 1997-98). Since there is no proper water supply to homes, sanitation becomes a concern. Pit toilets are common, and all garbage is dumped in separate pit holes.

Next to infrastructure, the issue that is of importance to the Tolai and Wampar people is accessibility to markets.

8.2.2.2 Markets
A smallholder farmer’s main source of income, as described in Chapter 7, Section 7.4.1, is through farming activities and they rely strongly on markets to sell their produce. In all study sites, farmers had access to roadside and main markets in town (Kokopo and Lae) to sell their garden produce, betel nut, cocoa, copra and livestock (see Appendix 8.1 for further details). Cocoa, copra, spices, and balsa markets are regulated, and provide a fair market for local producers. Most cocoa farmers sell their cocoa as wet beans to the fermentary owners at a low price. There are adequate cocoa fermentaries in all study site villages with intermediaries (cocoa buyers) except in Wampup village. There is a main fresh food market in Kokopo (ENBP) and Lae (Morobe) city; however, there are small roadside markets along the roads to both cities. Although there are markets, farmers often struggle to sell all their produce due to high supply, and as one smallholder farmer explains, they see the Government as needing to play a supporting role:

‘However, sometimes we produce a lot and flood the local markets and our produce becomes wasted, that is where government should assist to find good markets for us’.

There are no proper fresh food market chains to give the farmers options to sell their products to better markets. Setting prices for fresh produce is not by weight but by quality and size and sometimes by demand. That again varies as there are no proper regulations, pricing indexes or marketing channels set by agricultural extension agencies.
8.2.3 Agricultural Information Services

Vudal and Burit farmers have access to agricultural information given their close proximity to the University of Natural Resources and Environment (UNRE) campus, Kairak Vudal Resource Training Centre (KVRTC), Cocoa Coconut Institute Limited (CCI), National Agricultural Research Institute (NARI), and the District Agriculture Office. Despite all of these institutions being right at their doorstep, few farmers ever seek advice and nor do these institutions interact often with the farmers. The relationship between officers of these institutions and local farmers can be reflected in the following quotes from two agricultural extension officers:

‘...if you drive to the boundaries of this institute, very little is happening, people seeing this institution as one of the Government Institutes and [they] don’t know what’s happening here. Unless we make them to see and what this institute can bring to them [and] where they can take on the information’.

and

‘Yes, the adoption of technology is very low and they [farmers] need to change their mindset to treat the farms as business because that’s what they rely on for sustaining their families and cultural obligations, they have to change their mindset and treat the farms more like a business’.

There are, however, accounts of benefits emerging from officer and farmer interaction and between farmers who are receptive and willing to seek advice, according to one extension officer interviewee:

‘.....there are others who are receptive, who take in information, especially responding to clones where there are changes. So, if you go to farmers you will receive a mixed level of farmers, there are some who are receptive, and others who do not know anything, others don’t believe so there is a mixed bag of people’.

In general, the East New Britain Provincial Government (ENBPG) works closely with communities and is more effective in delivering basic services to the people in comparison to the provinces. The ENBPG also establishes a good network with other industries and partners, thus strengthening working relationship with all stakeholders.

In the Morobe Province, the Wampup and Gabsongkeg farmers are far from the extension or research institutions, but can easily access information when travelling into Lae City. There is also an Agriculture Extension Officer stationed at Wampar Local Government District near Gabsongkeg Village, but they are underfunded and consequently do not often perform their duties.
8.2.4 Human Assets

While formal education is more available to young people than ever before, few are able to advance into tertiary institutions and most return to their villages after completing their secondary education (Years 8-12). Most are subsequently unable to secure paid employment after schooling so they rely on their parents or farming as a source of income. Social problems arise when unemployed youth congregate in communities, with many youths being lured into making and consuming home-brew alcohol (hombru in pidgin) and drugs, especially marijuana, from which some may become vulnerable to involvement in petty crimes that lead to subsequent social unrest in the community. Unemployment and crime within the youth generation is a problem common to all villages in this study, as a smallholder farmer explains:

'...what is increasing in the Ward (village) is homebrew and drugs. Some of the young boys drink and swear on the roads and this kind of behaviour is increasing... (Pause)... These are the youths that finished or drop out at schools and are at home with their parents. The parents do not know, but they go and join the homebrew group and become involved in these activities'.

Apart from the social issues, youth unemployment also affects the availability of family labour. Labour supply is important in every household and poor relationships among family members can lead to reduced commitment and participation in farming activities, including cocoa production.

Despite the problems associated with youth unemployment, there are many instances where human assets play a critical role in shaping livelihoods. Some farmers, for instance, take leading roles in the agricultural community and participate in multiple-activities. These ‘leader farmers’ in each of the study site villages, most of whom have had some form of formal education and work experience prior to settling in their village, were shown to be open minded, risk takers, innovative and successful. Many were keen to see changes in their livelihood, and in the community as a whole, and several were willing to diversify in order to enhance their circumstances, as one farmer discussed:

'When I left my job (teaching) it was very hard to cope with the demands of my family.... I decided to look after chicken[s]. I then built a cocoa fermentary and started planting cocoa and then big disaster struck which was the CPB [Cocoa Pod Borer] disease. We were affected by CPB but I encouraged my wife not to give up on cocoa and we continued looking after our cocoa. We then went into piggery, I even built a trade store for my family. I got good support from my extended family members who have helped me and my wife to get through our tough times. Now we all are better off as we buy cocoa and have a fermentary. I now have three blocks of cocoa'.

Another cocoa farmer provided his cocoa block as a demonstration block to CCIL research officers who run farmer school field training for other cocoa farmers on his cocoa block:
A female farmer’s past work experience enabled her to organise women’s groups within the community and other districts.

'I used to be with the Government before as a Community Development Officer and after my retirement I came home and worked with the women back in the community. Based on my experiences, I was appointed as the Manageress for the Burit Cooperative Women’s Society and I am presently helping the women to start up small projects. And recently I was elected as the Secretary for the East New Britain Women and Youth in Agriculture Association so that is my new position ha... but also holding on to the Manageress position for the Burit Cooperative Society. I am also the founder of East New Britain Green Partners Women in Agriculture specialised in Livestock.... These are the kind of work I am doing at home with women'.

In Vudal and Burit villages, the women take a leading role in farming and community development activities with the support of their husbands, while it is the opposite with Wampup and Gabsongkeg villages where men have much say in livelihood activities including income-generating activities. Family Labour is the common means of labour in all villages. The head of the family has an important role to maintain a harmonious relationship between family members (especially grown up children) for ease of delegating livelihood tasks.

8.2.5 Financial Assets

The main source of income for the Tolai and Wampar villagers is through the sale of cocoa, copra, livestock, fish and surplus food crops from gardens. The Gabsongkeg farmers in addition raise chickens that are sold to Niugini Table Birds, a commercial chicken factory. Wampup farmers also raise cattle as a form of financial security. When they are faced with major financial constraints, they sell one or two of their cattle to meet their financial needs. Some family members earn income through paid work that helps to meet the costs of livelihood expenses. They may also receive some remittance as a form of income from family members working far off in other Provinces within the country.

The East New Britain Province (Tolai) has two currencies. Alongside the PNG currency of ‘kina’ and ‘toea’, the Tolai people also use tambu (shell money) as an alternative medium of exchange and still highly valued as a currency by the Tolais. In the Gazelle Peninsula in 2001 the provincial government accepted the payment of taxes and local courts award restitution and settlement of disputes, etc., in tambu. This makes the Tolai economy system unique. If they don’t have cash
money, then they can trade with *tambu* which gives the Tolais an advantage in pursuing their livelihood strategies (see details in Section 7.8.5).

Although farmers have various alternative means of earning income, the ‘*wantok*’ system seems to be a hindrance to tangible improvements in their livelihood because farmers find enormous pressure to share their income (see Section 7.5.2). Such an environment makes it difficult to save.

Informal credit and savings arrangements are not reliable due to non-repayment and the risk involved for the lender. Financial institutions like the Rural Development Bank and/or commercial banks are available to farmers, but their lending policies are more targeted towards commercial business with high interest rates which are not feasible for a simple semi-subsistence farmer. It is practically impossible for an average farmer to borrow money from most lending banks whose very purpose is unclear as most are unable to service the poor farmers, as two interviewees explain:

‘I always want to start up a small business, but the only problem is lack of funding or support from banks. That is the only setback’

and

‘When it comes to finance like Development Bank is for the rich man. Those who have money in account are allowed to borrow more and not for us. Banks are for rich people but I heard that the policy has changed and hope it will serve us the little man. If you are lucky to obtain a bank loan the principle amount borrowed is small but interest is very high and not attractive for us the grassroots. For example, you get a loan for a car for PMV, you repay the loan and once loan is repaid the car will be off road too because life of loan repayment is along with life span of car so what is the point. We are unable to make profit but the money is all for loan repayment’.

Socio-cultural assets are also an important component of livelihood assets.

### 8.2.6 Socio-cultural Assets

Tolai and Wampar communities may have some differences in their culture, but the principles of their social networks are quite similar. Social resources such as relationships, networks, associations, trust, reciprocity and exchanges, and belongingness are important to draw upon.

Section 7.5.1 presents all the socio-cultural aspects of the people of all study areas. In general, the Tolai are inclined to group work and associations while Wampar are at times more self-centred. However, both societies are influenced notably by the ‘*wantok*’ system that people still embrace to take care of each other. The socio-cultural asset is one of the strengths of all societies in PNG, including the Tolai and Wampar people.
The traditional ‘wantok’ system has important values and meanings that bind and strengthen the people and their traditions. and consequently social resources are rich in both societies. Through the ‘wantok’ system, within the norm of an extended family or a clan, each member can expect basic provisions and sustenance such as housing, food, health care, security, and a general sense of inclusion and belonging, and even money. The reward in return is reciprocated when the need arises. People in the community see this as an affirming way for the community to share its resources and it is a widely accepted practice.

8.3 LIVELIHOOD STRATEGIES

In the study areas, households or families construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living. The livelihood strategies or activities employed meet food consumption needs, provide sources of income, and meet the social obligations of the Tolai and Wampar families. Their livelihood also includes accessibility and benefits attained from social and public services provided by the Government such as education, health services, roads, electricity, water supplies, markets, and so on.

Most strategies have persisted over time, however due to changes in living arrangements and challenges faced today, some strategies have become transformed. This section describes the different activities that are used by the Wampar and the Tolai people to constitute their livelihood. The strategies are scaled into three (3) categories including:

i. Farming (cocoa, coconut, betel nut, food crops, and livestock [see Appendix 8.1]),
ii. Non-farming or spin off activities from farming (for example, cocoa fermentary, marketing food crops, fishing), and
iii. Off-farming activities presented in Appendix 8.2 (for example; sawmilling, roof thatching, household chores, employment for wages, running transport business, attending to community meetings, leisure or holiday time and so on.).

Of the three categories above, farming was noted as one of the main livelihood activities in all study sites and is described next, followed by non-farming activities, while off-farming activities are presented in Appendix 8.2
8.3.1 Farming

Farming is one of the main livelihood activities of the Tolai and Wampar. In this sub-section the farming activities of the study areas are considered in detail. PNG is predominantly a rural based economy, dominated in the early stages by subsistence agriculture and informal activities. However, in recent times there has been a transition from subsistence farming to market-oriented production in agriculture. In subsistence farming everything produced was consumed, while in the latter the crop is produced solely for market (e.g. cash crops, like cocoa and coconut) or the surplus is sold at markets after all household requirements are adequately met:

'We [husband and wife] grow food crops for consumption and when [we have] surplus we sell [it] in [the] market'.

Apart from food and cash crops, livestock is also raised for consumption, exchange and cultural rituals (ceremonies). Details of these markets is presented in Appendix 8.1.

The Tolai and the Wampar engage in several farming activities as part of their livelihood.

8.3.1.1 Cash crops

A cash crop is a crop grown for the purpose of selling, rather than using or for self-consumption. The main cash crops grown by both the Tolai and Wampar farmers include cocoa and coconut which are commodity crops mainly for export and so they have established markets. The price of cocoa and coconut (copra) is determined by the World Market. Betel nut is also viewed as a cash crop, but is only for domestic markets. Betel nut is widely chewed by almost all households in Papua New Guinea (PNG) and so it generates high demand in domestic markets.

8.3.1.2 Cocoa

Tolai farmers of East New Britain Province (ENBP) have cultivated cocoa since the 1950s, however, farmers in Vudal and Burit started growing cocoa in the late 1960s and early 1980s respectively, after obtaining blocks of land through the Land Settlement Scheme (LSC). Cocoa trees were old with a big canopy and often hard to prune or even harvest. Farmers were more or less foraging rather than farming their cocoa blocks.
Some of these factors contributed to an infestation of Cocoa Pod Borer (CPB) in 2006 that affected all cocoa trees. Farmers were subsequently advised by Agricultural Extension Agents to destroy all cocoa trees (chop and burn) and replant with new introduced CPB tolerant clones (variety) that were developed by the Cocoa Coconut Institute (CCI) scientists. Farmers were encouraged to attend integrated pest and disease management (IPDM) trainings to acquire skills to manage their cocoa blocks.

On the other hand, farmers in Wampup and Gabsongkeg relied mainly on betel nut for income until weevils destroyed the betel nuts in 2002, so they have been persuaded to plant cocoa in recent times. Most of their cocoa trees are mature and bearing, but there are some farmers who have just started growing cocoa in their blocks due to difficulties in obtaining cocoa seedlings.

In Gabsongkeg village there are more than ten (10) cocoa fermentaries but at the time of the study it was revealed that only two were buying wet beans. The wet beans at that time (May 2014) were selling at PGK1.80 per kilogram while dry beans were PGK8 per kilogram. Most farmers would make good money if they were selling their cocoa as dry beans, however, this was not the case.

On the other hand the Vudal and Burit have well established fermentaries and cocoa buyers in each village, however most of the cocoa farmers sell their cocoa as wet beans (at a lower price)
to dealers or fermentary owners. In order to sell their cocoa as dry beans for a higher price, farmers have to obtain licenses from the PNG Cocoa Board and that is often difficult due to arduous procedures and requirements. During the peak cocoa season from April to July, most farmers ferment and dry their cocoa, however during the non peak cocoa season, most treat their cocoa as a petty cash or discretionary fund. Women and children especially would quickly attend to the cocoa block to harvest a few pods and sell them to a fermentary owner to earn quick cash (‘kwik moni’ in pidgin) to spend on small items like store foods and other items for immediate consumption or usage, as one smallholder interviewee commented:

‘If I don’t have food right now on the table, I can run down to my cocoa patch, pick about 60-100 pods and I am already running to a dealer, and that’s it, get K10 or K20 in my hand I am already buying my rice. That is how easy and important cocoa is’.

While access to the money for these purposes was clearly important, the consequence of this type of practice was that low income was being generated from wet cocoa beans compared to what was possible if they had sold these beans as dry beans. In this way, many farmers treat their cocoa block as an automatic teller machine (ATM-available for incidental usages), where they can get quick cash from cocoa when small needs arise. Agricultural extension officers supported this finding:

‘... before CPB came in cocoa was regarded as an ATM where a farmer needed some cash, he would just go to the cocoa garden, hook down [a] few cocoa [pods] and would [then] sell for cash’.

and

‘Because of our culture, they (farmers) see cocoa as a last resort or ATM mentality, when they need money to do [a] family obligation, cultural or social obligations they attend to cocoa blocks. They don’t see cocoa to sustain them as a business, ha’.

Furthermore, most Tolai farmers are unable to extend their cocoa blocks due to land shortage and pressure, while Wampar farmers on the other hand have vast areas of land with potential to grow more cocoa, but they have not done so due to factors mentioned above. The other contributing factor was that farmers of Wampup and Gabsongkeg were not familiar with the crop (cocoa).

Despite the challenges, cocoa is the most important cash crop of the study areas and other coastal regions of Papua New Guinea. Its importance as a source of cash is illustrated through consideration of how it affects everyday life, as described in Box 8:1.
obligation costs. A farmer from one of the study areas shared his story on how he started growing cocoa:

‘People were saying, plant cocoa, plant cocoa, but I was not too keen but it was a time I helped one of my uncle with his chicken project. He had contract with Niugini Table Birds and sells his birds to them. He was a cocoa grower as well and knew that I had no cocoa so he assisted me with some of his chicken money to buy cocoa seedlings to plant in my block. He said cocoa can make you good money and will help you and your family in the future. He bought cocoa seedlings and gave it to me and I started growing cocoa. Now that I have cocoa, I realise that what my uncle said was true. Cocoa is now helping me and my family. I am able to meet my children’s school fees, meet medical expenses, meet family and community obligations. It’s not like working with companies and waiting for paydays. With cocoa I can harvest any time and have money every day. Cocoa helps me a lot and it is important to me and family’.

Almost all farmers interviewed said cocoa was rooted into their farming system.

‘One of the important things in my life is cocoa because it brings good money that contributes a lot to the well being of my family’

and

‘Cocoa is very important to my life as my parents were growing cocoa; I grew up with cocoa and now I depend on cocoa so cocoa is everything in my life’

**Box 8.1 How cocoa is considered central to smallholder life**

The average cocoa yield (dry beans) per hectare at the time of this study could not be obtained as no proper records were available. However, according to a baseline resource survey conducted by Bris Kanda (2008), farmers in Gabsongkeg have the potential to produce 900kg/hectare which is far greater than the farmers of Vudal and Burit or even other cocoa growing areas in the country.

Cocoa farming is labour intensive and so often it requires the whole family to work in the cocoa blocks. However, the intensity of work depends on the life cycle and development phase of the cocoa. For instance, more attention is required during clearing, planting, and pre-maturity stage. Once cocoa is established then there is less to do except harvesting and pruning. The next most important crop to cocoa is coconut for copra.

**8.3.1.3 Coconut and copra**

Coconut palm is grown not only in the study sites but throughout all coastal areas of the country and the tropics, and has an important role in smallholders’ livelihoods as a direct source of cash income, nutrition and materials. As in the wider Pacific region, it is conventional for meals to be cooked with coconut milk, and coconut water is used for drinking, so it is used daily by most families. Apart from food uses, coconut is the second important cash crop after cocoa and is
often sold as copra to export dealers. Other uses of coconuts include oil, medicine, broom and mat making, basket making, building, firewood, and producing a local brew called tuba.

Growing and managing coconut is simple but copra production is labour intensive. It involves collecting fallen coconuts, de-husking and splitting them, and removing and drying the coconut meat (cure). This typically means the whole-of-family labour is required. Some farmers even hire labourers, especially youths, in exchange for a good meal or cash.

Cocoa and copra are exported cash crops but betel nut is sold and consumed locally and is described next.

**8.3.1.4  Betel nut**

Betel nut (*Areca catechu*) is cultivated mainly across tropical Asia and Indonesia to central Pacific and Papua New Guinea. It is known as ‘*buai*’ in Papua New Guinea. Betel nut is a slender, single trunked palm that can grow to 30 metres and bears small green nuts and when ripe it turns orange-red and becomes hard (see Plate 8.3). Betel nut takes 5-7 years before bearing.

[Plate 8.3 A betel nut (Areca catechu) palm bearing matured nuts]

Betel nut is one of the most successful domestic cash crops in PNG because there is high demand for it. Almost all coastal areas of PNG grow betel nut including the Tolai and Wampar regions. In fact the Wampar people were once the largest producers in PNG until 2002 when the betel nut palms were destroyed by weevils. (Refer to Box8:3 for details of the betel nut story). However, the Tolai and the rest of the non-infected coastal Provinces still produce betel nut in large
quantities. People from the Highlands are non-producers but they are the main buyers and consumers. Betel nut has become one of the most important components of rural and urban food markets. There are betel nut sellers (as well as lime and pepper sellers) at markets throughout the country, and many specialised betel nut markets and betel nut vendors constitute the bulk of the urban informal sector. Consequently, betel nut production contributes a lot to the livelihoods of farmers and to the various parties along the marketing chain.

8.3.1.5 Potential (alternative) cash crops

Apart from cocoa, coconut, and betel nut, other cash crops were also grown by Wampar and Tolai farmers but have been abandoned due to lack of markets and low prices. The alternative crops observed in some of the blocks of the Tolai farmers were robusta coffee, balsa, cardamom, and vanilla while Wampar produced vanilla and mango. Of the alternative crops, vanilla had a successful story but collapsed due to poor quality curing and handling which led to low prices. Besides cash crops, most farmers spend far more time on growing food crops for sustenance. These are often sold locally and are discussed next.

8.3.1.6 Food crops

Food crops are grown for self-consumption or use. Surplus production is traded or sold, normally at local markets, for extra income. In all rural areas, gardening is the principle livelihood activity through which people produce most of their food for consumption, animal feed, exchange, or to be marketed as surplus.

Most Tolai and Wampar households make three to four gardens in any given year depending on family size and subsistence and market needs, although old gardens may continually be harvested as perennial crops produce over several years. In some respects, this may be viewed as a deliberate mitigation strategy to deflect against crop failure and other risks.

Depending on the size and number of the gardens, the staple crops are always considered first and are often grown on the best (fertile) land with priority over non-staple crops. Staple crops for the Tolai are somewhat similar to Wampar but they have their own preferences. For example, the Wampar prefer banana, taro, sweet potato, yam, and sago while the Tolai prefer sweet potato, Colocasia taro, Chinese taro (singapo), banana and cassava. Along with staple crops they grow leafy greens called ‘aibika’ (in pidgin) normally cooked with coconut cream in
almost every dinner. In recent times the demand for peanuts has increased just about the time of the CPB incursion, so farmers began seeking alternative crops for income. The situation triggered them to grow more peanuts than ever, creating a good income according to one farmer:

... ‘during the time when the CBP invaded our cocoa block, we relied on peanut because we earned a lot of money and you know it is not a hard work in growing peanut. Therefore, we were reliant on family members. One garden of peanut would give us K500 - K1000 and that is big money. So that’s how we sustain ourselves during the post CBP invasion’.

Plate 8.4 Garden vegetables sold in local markets

8.3.2 Non-Farm Activities

Non-farm refers to those activities that are not primarily agriculture. However, non-farming does include trade, fishing, or processing of agricultural products. The term non-farming should not be confused with off farming. The latter generally refers to activities undertaken away from the household’s own farm or to activities that are non-farming, such as employment in town. According to the researcher’s interviews and discussions, the following non-farm activities were indicated: processing wet cocoa beans in a fermentary, marketing of produce in local and urban markets, producing of baskets, making thatched sago roofs, making brooms, and fishing (especially Vudal villagers).

8.3.2.1 Cocoa fermentaries

The peak cocoa season is from April to July and the second mini season is from November to February, however moderate amounts of cocoa are harvested weekly throughout the year. After cocoa pods are harvested, the beans are removed and cured. There are two critical processes
involved in the curing of cocoa beans: fermentation and drying. The fermentation and drying process develops the unique flavour and aroma so it is a critical process, Hence the fermentary owner has to monitor all processes thoroughly before the beans are dried, as in Plate 8.5 that shows a hot air dryer using burning wood. After five to seven days the beans are packed into bags for sale to cocoa buyers or direct to exporters, for example AgMark or Monpi.

Plate 8.5 A cocoa dryer in a fermentary house

The fermentary owner makes more money than a cocoa grower without a fermentary. The cocoa regulatory body (PNG Cocoa Board) issues a licence to approve a fermentary operator who meets certain criteria. If the operator does not comply, then his licence can be cancelled. During this study some farmers complained about the process of how fermentary licences were issued, including making suggestions of corruption:

‘…I want to build my own fermentary and [I’m] still struggling. Most owners got their fermentary licences through back door deals with PNG Cocoa Board officials. Most owners have not met the requirements, some even do not grow cocoa, but they have fermentary’.

Dry cocoa beans are sold at a higher price than wet beans thus enticing more farmers to build cocoa fermentaries, however one of the PNG Cocoa Board regulations is that cocoa farmer cannot own a fermentary unless they have more than 1300 cocoa trees, which is a problem to farmers with limited land.
8.3.2.2  Marketing activities

Marketing is one of the most important activities that facilitate the transaction of the produce (food crops, cash crops, livestock, fish, and crafts) from farm to consumer in return for money (income). Marketing is the most crucial process in the chain of agricultural production, especially in the rural settings where the main way of earning income to meet their subsistence needs is through selling their produce. So, who does the marketing? According to the interviews, observations and discussions with both men and women in the study areas, men seem to dominate the sale of cash crops like cocoa, copra and livestock, that bring higher incomes while women sell items that bring a smaller amount, like food crops, crafts, fish, cooked foods in markets, and a few wet cocoa beans. For example, a farmer interviewee said:

... 'I tend to make more money, especially from sales of cocoa. She [wife] makes decisions on the use of the money obtained from the sale of food or garden crops'.

In fact, market attendance was one of the woman’s most important and regular activities for bringing in income to sustain the daily needs for the family.

Plate 8.6  Women selling food crops in main market (Kokopo)

Earnings that the women obtain are used for a family’s daily needs like cooking oil, soap, sugar, tea, tinned fish and rice. Not only do they meet daily needs but also they save part of their earnings for children’s school fees and associated uses. Many women have become the primary providers for their families and key contributors to their communities.
There were disputes, especially in the distribution of money earned by men from cash crops (cocoa and copra). Little appears to be given to the wife and children, however, most tension seems associated with money that is misused or said to be spent on beer and/or gambling. This also triggers non-cooperation in family labour use, where women and children may sometimes refuse to work on cocoa blocks because of how the money is distributed. Nevertheless, not all men misuse money earned from cash crops and livestock, but some do discuss with their wife and share accordingly, as claimed by one male farmer:

‘....I don't make decisions on my own. Whatever I want to do, I seek her views and we both decide together’.

In general, Tolai women make major decisions regarding financial distribution. Indeed, men would sell cocoa and copra but budgeting and usage of the money would be discussed with their wives. Perhaps this is because Tolai are members of their mother’s lineage as a matrilineal society, so women play a significant role in decision making within the household and the society. For example, when asked, a Tolai woman said:

‘Well... (Smiling)... I would say, I make most of the decisions and my husband would only listen, as I am more innovative than my husband is. I make most of the decisions because what I make enables my family to prosper.

8.3.2.3 Fishing

Apart from farming, artisanal fishing is another activity that is only practised by farmers in the far North of Vudal village who live close to the sea. It was difficult to establish whether they could be classed as fishermen or farmers because they were equally engaged in both activities, however in this study I referred to them as farmers.

They catch fish for consumption (vital protein) and sell it in the markets. Men, women and children are involved in fishing activities. They fish in reefs, mangroves and sometimes in deep seas, especially trolling for tuna and mackerel. They catch mainly reef fishes (cod and groupers, trevally, parrot fish, perches and snappers), garfish and sardines near the shores, and collect crabs from mangroves. During the day, they work on their farms, but in the evening they go out fishing.

Fish is important in the Tolai people’s diet and so there is often high demand, thus creating a good market for the farmers of North Vudal. People at times place orders in advance and the folks would go out to catch for them. Good money can be made from selling fish:
"...I would go out fishing at times if we are short of protein or if we receive orders. My wife and I are both fishermen. We spend most afternoons and evening fishing. Sometime when we run short of money my wife and I go to the sea and catch fish. My wife then sells the fish on the roadside. We can make K100-K200 or more in a good fishing night.'

The fishing activity is seen to be equally important as cocoa in terms of revenue, however fishing has a great potential as the demand for protein continues to be high in both rural and urban areas. Although fishing has great potential, it does, however, carry some constraints. For example, to increase catches requires proper fishing equipment, adequate post-harvest handling techniques and storage (ice), and sound technical advice.

8.3.2.4 **Production of sago roofing, baskets, and brooms.**

The other non-farm activity apart from what was discussed above is craft making. Women in all villages of the study sites were able to make brooms from the dried pinnate leaves of coconut, although normally the children would help. It is done during free time as it is not a difficult task. Dried leaves are removed from the stem of pinnate stem and the thin strips of stems are bundled to a holding size and the base of the stem is tied with a rope to form a broom. Each broom is sold in the market at PGK2.50.

The roofs of the houses in most coastal villages are made from leaves of sago palms. Sago palm (*Metroxylon sagu*) grows widely in most coastal regions, especially in swampy and waterlogged areas. The starch extracted from the stem is an important staple food for people in many coastal regions, including parts of Morobe and East New Britain Province. The leaves of the palm are sewn onto strips of palm or bamboo rafters to make the roofs of houses in the village. Due to scarcity of sago palms, there is a demand for sago roofs, and so some farmers of North Vudal get into the business of making sago roofs and selling to the public. It is another source of income and may continue if they manage their sago palms well. A farmer detailed his family ventures into producing sago roofs:

‘...We make sago roofs and sell to customers who need them. We normally get many orders and it keeps us so busy making sago roofs. Because there are many other things to do as well, so I only attend to when I get good orders. My wife and children help me because it’s a hard work, but it gives good money too’.

The Tolai people especially carry baskets with them at all times. In the baskets they often store their betel nut, betel piper (daka), lime, and leaves of fragrant plants. It is an accepted custom of a Tolai man. Women normally carry larger baskets as well. If you are a visitor from another province in their village, it is their culture to welcome you by presenting you with a Tolai basket
containing betel nut which are a gift. It is a sign of your acceptance into the village. Many visitors and/or local tourists buy Tolai baskets as souvenirs or gifts for their friends so the trend triggers the demand for baskets. Therefore, many households in recent times have started making baskets and other crafts from coconut leaves which are mainly sold in Kokopo Market (see Chapter 7, Figure 7.9).

8.3.3 Off-Farm Activities

‘Off-farm activities’ generally refer to activities undertaken away from the household’s own farm or to activities that are non-farming. These activities are engaged in for income generation or for social and/or spiritual obligations which does not relate to farming or post-harvest (non-farming) activities. According to the interviews, discussions, and observation, the following off-farm activities were indicated or identified: general chores and up keep, paid labour (employment outside own farm), sawmilling, running paid transport (PMV) business, attending to cultural obligations, church activities, and cosmopolitan or leisure time. These activities are presented in Appendix 8.2.

Of the livelihood strategies it was apparent in all study sites that all farmers grew cocoa as a cash crop; however production of cocoa remains low, thus, the next section discusses the constraints in cocoa production.

8.4 CONSTRAINTS IN COCOA PRODUCTION

One of the main objectives of this thesis is to understand why cocoa production has remained low for decades. Thus we need to understand the dynamics of cocoa growers’ livelihood strategies and socio-cultural factors that affect farmers in undertaking certain livelihood activities and where cocoa fits in. Thus, this section examines the challenges or constraints in cocoa production and establishes vulnerabilities that affect farmers and the livelihood system in all the study sites.

8.4.1 Challenges in Cocoa Production

Despite the importance of cocoa production, there remain several constraints that hinder its overall production achievement. According to the literature (and as pointed out in, Section 1.3.5,) the main factors limiting cocoa production include poor farm management practices, land
shortage (Curry et al., 2007a; Daniel et al., 2011), labour (Omuru et al., 2001), and low cocoa prices (Curry et al., 2007a; Eric Omuru, 2001).

Exploring these factors within this study established several additional issues and challenges affecting cocoa production (see Table 8.1) including:

- cocoa pod borer (CPB),
- laziness,
- land tenure and shortages,
- lack of cocoa seedlings,
- low cocoa prices (for wet beans),
- slow or lack of adoption of cocoa technologies,
- lack of extension visits and/or follow up visits,
- lack of cocoa fermentaries (especially Wampup Village), and
- other cultural influences.

Perspectives on the major constraints to cocoa production were captured across all interviews within this investigation. The more commonly discussed issues are captured within Table 8.1.

Table 8.1 Constraints in cocoa production as stated by participants

<table>
<thead>
<tr>
<th>Constraints / Issues</th>
<th>Statements</th>
<th>Source</th>
</tr>
</thead>
</table>
| Cocoa pod borer (CPB) | ‘CPB was the main problem that affected my cocoa trees and affected all production in East New Britain’.  
‘One of the major blows in our progress was cocoa pod borer’ | Farmers  |
| Low cocoa price (especially wet beans)* | ‘We really like to grow and sell cocoa but low price over the past years is the only factor that discouraged us from growing cocoa’.  
The other problem that discourages me from growing cocoa is that the system that forces us to sell wet cocoa beans because I don’t have fermentary. As you know wet beans are sold at lower price than dry beans. CCI don’t see the problems we go through…I would prefer selling dry beans, but hard to build a fermentary due to CCI regulations’. | Farmers  |
| Land shortage (issues)** | ‘If I want to plant more cocoa or do something on the customary land I would think twice that it won’t be my children who will benefit, but it would be my niece and nephews according to Tolai customs where women inherit land and not men’.  
‘Cocoa is here to stay, but we must have more land to grow cocoa otherwise land shortage is a problem’.  
‘Many huge cocoa blocks are chopped and they (farmers) are selling those lands to other people from outside (non-cocoa growers) and this is a big problem. Numbers of cocoa trees have decreased over the years and will result in low cocoa production’. | Farmers  |
Laziness | ‘One of the problems is that people are too lazy to work on cocoa. If men work hard in their cocoa blocks, there will be good cocoa’. Cocoa pod borer is a disease for lazy farmers, if you don't manage your cocoa block the CPB will live with you. If you can work hard and manage your block to keep away CPB you will still produce good quality and quantity of cocoa. Many (farmers) are lazy’. | Farmers

Culture | ‘In my view it has a lot to do with culture as well or social way of doing things, but also as I have said farmers do not treat cocoa farm as a business. They don't have plans, they do not put money away to fund the inputs back into the blocks like fertilizer, chemicals, planting materials for replanting’. | Ext Officer

Lack of cocoa seedlings | ‘...but our main problem is cocoa seedling as CCI does not produce enough cocoa seedlings to supply us’. ‘...one of the major issue that farmers do not have access to the latest planting material we have which are tolerance to CPB’. | Farmer

Lack of adoption of cocoa innovation | ‘Yes, the adoption of technology is very low and they need to change their mindset to treat the farms as business because that’s what they rely on for sustaining their family and all this they have to change their mindset and treat the farms more like a business’. | Ext Officer

Lack or no fermentary (Wampup) | ‘We are happy with cocoa, but one major issue is we don’t have a cocoa fermentary. We continue to plant but once we harvest, we face problem to transport our wet beans to the fermentary to sell. We need a fermentary in the village, but it’s difficult to get licences’. ‘...We are unable to ferment and dry our cocoa beans to sell at a high price because we don’t have a cocoa fermentary’. | Farmers

Lack of extension visits | ‘In the past say 70s – 80’s the DAL use to visit us and did a lot of extension work. From 90s and 2000 onwards these people don’t do their work’. ‘I just learn from other cocoa farmers to grow and manage my cocoa. We do have some extension officers who come, but they deal directly with people who have big cocoa blocks. They have no time to see small farmers like me or address the whole community. They come to visit certain individual farmers and go’. | Farmers

Lack of Govt Extension Support and follow up | ‘They only run training and give certificates, but we do not implement what we have learnt because there is no support’. ‘... ‘how I see extension and research officers is that they do not understand our problems that’s why they do not deliver what we need’. | Farmers

* Low cocoa price is linked to the selling of wet cocoa beans due to lack of cocoa fermentaries or because it is difficult to obtain fermentary licences.
** Shortage of land not only by means of densely cropped, but land sold to people who have never grown cocoa. The other factor is farmers’ disincentive to grow more cocoa due to the matrilineal land tenure system.

### 8.4.2 Cocoa Pod Borer (CPB)

Farmers of Vudal and Burit expressed their concerns about CPB but not much concern was reported by the farmers in Gabsongkeg and Wampup. CPB has entirely destroyed the old cocoa trees in Vudal and Burit. Most farmers have chopped and burned down all infected cocoa trees and now have new CPB tolerant trees in place where most trees are now bearing but require
constant maintenances such as pruning, weeding, removal of deceased pods, spraying, fertilizing and so on. Such activities require more money and constant labour, which puts a constraint on the farming family who already have other livelihood activities to attend to. A lot of effort is required in producing better cocoa, especially in managing cocoa blocks in order to control CPB, and low cocoa prices make some farmers lazy or focus on other income generating activities. Some farmers have simply abandoned their cocoa blocks.

To illustrate the emotional and personal depth of vulnerability situations. **Box 8:2** presents a story, based on interviews with cocoa farmers, about Cocoa Pod Borer (*Conopomorpha cramerella*) disease, that affected all cocoa trees in East New Britain Province (ENBP) thus affecting all cocoa farmers and the industry.

This story tells us about the incursion of CPB and its impact on the cocoa farmers of ENBP (including Vudal and Burit villages) and their livelihood. It was reported that CPB was first detected near Kerevat, East New Britain Province (ENBP) in 2006. Since then the disease has spread to other provinces and infected all cocoa trees. No one, (including CCIL and NARI) was prepared which resulted in all farmers and the communities suffering. The eradication program (initiated by CCI, PNG Government and International Partners) was eventually implemented by chopping and burning down all cocoa trees but CPB could not be eradicated. CPB had devastated the cocoa farmers, the cocoa industry, and the government. Here is what some farmers said;

‘...when the cocoa disease called CPB came I was asked to chop down all the cocoa trees. I was reluctant, but had no choice but listen to the government (research & extension officers)’.

‘When CPB came, it affected all our cocoa trees and that has affected our livelihood. We were told to remove all our cocoa trees, which we did. I suffered... since Cocoa pod borer came and destroyed our cocoa, life was difficult as we had nothing to rely on’.

‘We depended on cocoa and when destroyed by CPB, we suffered, yes, we had gardens for food crops and vegetables to survive, but this could not make enough money to cater for the school fees of my children which is important’.

CPB could not be eradicated, therefore the CCI and the team responded and switched from an eradication mode to a management mode with the development of an integrated pest and disease management (IPDM) package. The IPDM has been advocated to cocoa farmers to implement in their farms, but with mixed signals, as most farmers are not investing into their cocoa farms, as they could not afford the inputs (chemicals, hand tools, labour).

‘CPB came and destroyed all our cocoa, but now a lot of them are back into it again (coughing)... (wife indicating to say something). The World Bank and the government through Cocoa Board have invested a lot of money into cocoa and CPB but we are yet to benefit. Only few farmers who have money make their contributions and the Cocoa Board funds them from the World Bank project. Many of us do not have money to start so we miss out .

Research and Extension Officers have also expressed their view on CPB and the uptake of IPDM by farmers:

‘In fact, we have records of farmers, we are monitoring and reducing the infection of CPB to 95-98%. For me IPDM technology is working and that’s the way to go, but again, what you have now is the input, you have to have chemicals, you have to have tools, but when our farmers are living a life of a subsistence it becomes very difficult for them to acquire tools, equipment, chemicals. That is why the policy issues come in, if our farmers are not in a position to move away from this system?"
Box 8.2. The story of cocoa pod borer (CPB) and its impact on cocoa farmers of ENBP

Most cocoa farmers of Vudal, Burit and some in Gabsongkeg are unable to extend their current cocoa blocks, as they do not have adequate land to do so (see footnote* above). Others who have land, especially in Wampup village, claimed that they are unable to get cocoa seedlings to plant. It was obvious that there is a lack of extension support and linkage.

Farmers also claimed that although CCI extension agents run cocoa training, there is no follow up or even provision of cocoa seedlings. On the other hand, the farmers in Vudal and Burit have access to CCI facilities in Kerevat but are often ignorant of it or are simply not interested. Although cocoa technologies such as IPDM practices and CPB tolerant cocoa plants are available, adoption of these technologies is low. Farmers from Wampup expressed concerns about the cocoa fermentary, as it was difficult for them to obtain a fermentary licence from PNG Cocoa Board. Hence, all their cocoa is sold as wet bean at a low price, often discouraging the farmers from attending to the cocoa fulltime, but rather only when they need some quick cash. Some Extension Officers believe that farmers do not take cocoa production as a business since less resources (time, effort and money) are invested back into it. The key point to this is that there are number of issues interwoven within the socio-cultural factors, farmers’ life style, and lack of extension support that impact on cocoa production. These are discussed further in Chapter 9.

8.5 VULNERABILITY

Farmers engage in a range of livelihood activities, however, they are often confronted with challenges largely beyond their control, and this is the concept of vulnerability. The factors that lead to vulnerability have a direct impact upon farmers’ assets and the options open to them in their pursuit of beneficial livelihood outcomes. According to the interviews, discussions and observations, farmers were affected by both external and internal events such as shocks (natural disasters such as pests, diseases, and volcanos), critical trends (demographic, government institutions and policies, technological trends), and seasonal or circumstantial circumstances
(such as price or migration). One example of a vulnerable situation is the story of CPB as described in Box 8:2 above.

On the other hand, in the Markham Valley of Morobe Province (including Wampup and Gabsongkeg villages), a destructive palm weevil destroyed all betel nut palm trees in 2002. Betel nut was the main cash crop for the Markham people and so households of Wampup and Gabsongkeg suffered. The betel nut story in Box 8:3, provides an insight into how vulnerability can have a significant impact on farmers’ livelihoods.

This story describes the rise and fall of betel nut and its impact on the Wampup and Gabsongkeg farmers’ livelihood. Interviews and discussions with the farmers of both villages (Wampup and Gabsongkeg) indicated that in the past (1970 – 2000) they were solely dependent on betel nut (Areca catechu) and elongated betel piper (Piper betle) as their source of income. Betel nut (Areca catechu) is a small nut harvested from a particular variety of palm tree and the fresh nut is chewed with betel pepper and lime (from coral). Most of their gardening land and land around the houses was planted with betel nut palms and piper. Betel nut has traits of growing well without much input or maintenance apart from minor weeding. Betel nut requires less or no labour, so it was an easier and more convenient crop to grow for revenue than other cash crops at that time.

‘... in the times of betel nut people were not keen to grow cocoa, they only focused on betel nut because no hard work involved. Betel nut trees do not require work to maintain just plant and the tree takes care of itself. People became lazy they just harvested their betel nut and sell’.

In maturity, every member of a family would harvest betel nut twice or three times a day and sell it along the Highlands Highway roadside markets just near their village at a price of K20 – K50 (K1: US$1 at that time) a bunch depending on size. Betel nuts were easily sold mainly in bulk to traders from the Highlands, as the demand has always been high. It was revealed that each member of a family (toddler to granny) had money in their pockets daily. It was obvious that they were living comfortably with a good income generated from the sales of betel nut only, as described by village folks:

‘In the past people here were depending on betel nut. Betel nut gave them a lot of money. They got money now, tomorrow, the next day, etc. For example, if they harvested and took say 7-10 branches of betel nut in the morning to the roadside market, it was sold by lunch and he returns and goes back with few branches again and sells in the afternoon. So in a day he or she would earn about K600 – K700. The living standard of people was high, people would literally drink (alcohol) on Monday, Tuesday, Wednesday, Thursday and continue, it was normal then. Protein is scarce in most parts of the country, but here people were eating chicken every day in all diets as they can afford. There is no electricity here so each family bought their own generators. They had cars and misused a lot of money’.

The higher cash flow in the community brought in changes in people’s living standards in terms of clothing, availability and abundance of store foods, electrical goods for home use, vehicles, and so on. Despite the benefits, the surplus cash flow in the community also changed people’s behaviour and attitudes that triggered numerous negative issues.

‘People earned a lot of money from the sales of betel nut and there were a lot of issues associated with more money. Men were drinking a lot causing social and domestic problems, prostitution, stealing rate was high, conflicts and fights. There was more money and problems associated with it. So when betel nut vanished due to disease these problems slowed down’.

People were not attending to food gardens, but instead had long holidays, spent money on alcohol and non-essentials, and children missed classes. It was apparent that people were focused on short-term strategies rather than savings or long-term investments. However, in the year 2000, a palm weevil attacked and destroyed all betel nut palms in the region of the Markham Valley. The
Gabsongkeg and Wampup people lost all their betel nut palms with drastic effects on their livelihood. There was virtually nothing that they could rely on to survive. It was a disaster, and the whole community was devastated and suffered:

‘... when our betel nut was destroyed by disease people didn’t know what to do to support their families... people’s morale was down with lots of pressure as they had no money to meet their needs. ... people really suffered - no more happiness, no movement of people, so people started to attend to gardens. People in this community relied on betel nut for their survival and when the crop was destroyed, people were devastated. So people were looking for alternative cash crop and identified cocoa as a crop to go for.

It was not clearly established whether they sought advice from the Business Development Officers or Extension Officers for directions about managing their revenue and/or to invest in alternative cash crops in case of disaster, or if they had the agents visit the villages to advise and conduct simple management training. Some villagers, especially from the Gabsongkeg, sold their land to outsiders from other provinces as quick money after the betel nut was destroyed.

**Box 8:3 Vulnerability: the betel nut disaster of Gabsongkeg and Wampup Villages**

Only after the destruction of betel nut palms in 2000 did most people of Wampup and Gabsongkeg seek other farming alternatives and non-farming activities to survive. That is the time when many farmers turned to cocoa, although there were a few who had grown cocoa in the past but with less attention.

The second trend referred to as seasonal or circumstantial vulnerability may also affect farmers’ livelihoods - for example, the price of cash crops like cocoa and copra. When the cocoa price drops, based on the World Commodity Market, it affects the small farmer. At the time of the interviews, cocoa and copra prices were low; for example, cocoa dealers were buying wet cocoa beans at a rate of PGK1.80 per kilogram. Such low prices discourage farmers from focusing on cocoa, as expressed by a farmer:

‘We really like to grow and sell cocoa, but low prices over the past years is the only factor that discouraged us from growing cocoa’.

Farmers in the four (4) study site villages have experienced various vulnerabilities, yet they continue to cope and operate to improve their livelihood, depending on the types of assets available and their accessibility. Such experience prepares them better to diversify into many livelihood activities in order to minimise risk and to achieve their livelihood outcomes as some of the farmers alluded to below in **Box 8:4**. Farmers shared some of their goals or desired outcomes and these are discussed in the next section.
8.6 FARMERS LIVELIHOOD OUTCOMES

It is important for RD&E agents to understand the desired livelihood outcome of small holder farmers so that they can facilitate the processes of change in any rural interventions. Farmers within this study regularly cited a desire above all other things (including cocoa production), to see greater things happening in their children’s future and to experience better living standards. More specifically, some of the livelihood outcomes as asserted by the farmers included more income, improvement in their children’s education, building permanent houses, a healthy community, increased well-being and reduced vulnerability. Examples of the priority livelihood outcomes can be illustrated in the expressions captured in Box 8:4.

<table>
<thead>
<tr>
<th>Farmer aspirations when it came to livelihood priorities were often basic and simplistic.</th>
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</thead>
<tbody>
<tr>
<td>‘As you can see the house we are in right now is made of bush material. I wish to have a permanent house and to have electricity. I want my children and their children to have better education, to live in a good house and better improved life after my wife and I die’.</td>
</tr>
<tr>
<td>‘I have goals to increase the number of cattle but I don’t have enough money to increase stock in my farm’.</td>
</tr>
<tr>
<td>‘In the future, I don’t want to expand, but to manage and maximise the use of what I have now. Like for cocoa I will struggle to build a fermentary. For chicken project, I will build a more permanent poultry house than the kunai house I am currently using. I will renovate my house and perhaps extend. I plan to buy a small car for my family’.</td>
</tr>
<tr>
<td>‘I consider the church work is important, especially counselling youths to live a better life than into drugs or doing stupid things in the streets’.</td>
</tr>
<tr>
<td>‘I need a technical school on my land so it can help my people to acquire knowledge about new ways of doing things to improve their lives. That is my dream’.</td>
</tr>
</tbody>
</table>

**Box 8:4 Farmers desired livelihood outcomes**

Farmers make certain choices that are influenced by their hopes and aspirations, as well as by the shifting opportunities or constraints that they are faced with as described in Box 8:4. These choices lead farmers to diversify into various livelihood activities. Cocoa is only one of these priorities, and often not the highest priority.

8.7 CHAPTER SUMMARY

This chapter presented a synopsis of various livelihood strategies undertaken by the farming households of the four (4) study areas in two provinces (East New Britain and Morobe). Such undertaking depended on the availability and accessibility of assets and the combined use of
assets in many different ways to generate positive livelihood outcomes. This chapter began by describing farmers’ asset capitals that enabled them to pursue various activities to sustain their livelihood. The key assets identified were natural, infrastructure, human, financial, and sociocultural. The combination of these assets has contributed significantly to achieving some of the farmers’ goals, or may have alleviated some setbacks and challenges.

There are a number of livelihood strategies undertaken by farmers and these were classified into three main categories, (i) farming, (ii) non-farming, and (iii) off-farming activities. Farming (crops and animals) was seen to be the main activity of the people in the study areas for the purpose of sustenance in terms of food, marketing for cash income, and wealth (livestock). Among farming activities, cocoa was one of the main cash crops grown although not much effort was put into its production. There may be reasons for that but it was obvious that farmers diversified into other money generating activities besides farming (non-farming and/or off-farming activities), perhaps to reduce risk. For example, farmers in Vudal and Burit experienced the destruction of their cocoa trees by CPB and have since diversified to other income generating activities rather than focusing only on cocoa. A similar situation arose with Wampup and Gabsongkeg farmers when weevils destroyed their betel nut trees. Apart from the risk factor for diversification, farmers have their desired goals in life which motivate them to continue with various livelihood activities they engage in to achieve their outcomes. For example, some farmers work hard to earn enough to build a good house or pay for their children’s education.

Farmers are also entrenched in their cultural obligations of distributing their scarce resources across multiple activities such as church work, leisure activities, and cultural ceremonies. These activities are for self-use as well as community benefits. Hence, farmers construct a diverse portfolio of activities and social support capabilities in their struggle for survival, not merely for money but also to uphold socio-cultural norms and beliefs.

The next chapter describes the dynamics of the enabling agents (agricultural extension and research) and the role they play in enhancing farmers’ livelihoods as well as the challenges they encounter.
9 CHAPTER NINE: ENABLING AGENTS THAT INFLUENCE COCOA PRODUCTION

The previous chapter provided details of the livelihood strategies and assets available to Tolai and Wampar farmers. In order for farmers to successfully engage their livelihood strategies in farming, they must have available access to good enabling agencies and service provision such as cocoa research, development and extension. External factors such as generating relevant agricultural technology and disseminating it effectively to end users (farmers) remain a huge challenge within PNG. Over the past decade the conventional extension approaches of technology transfer have moved towards a more people-centred research and development approach.

This chapter describes the details of the current agricultural extension and research services provided within PNG and the extent to which these services are associated with livelihood strategies amongst smallholder cocoa farmers.

9.1 INTRODUCTION

Beyond the livelihood assets and strategies that farmers undertake and have control of, or access directly, farmers also depend on external factors, especially various enabling agents and service providers (government, extension and research) to provide them with essential goods and services that they need to support their livelihood activities (see Figure 6.1). This chapter describes the cocoa extension and research services available to cocoa farmers, as well as the structure and processes used by each of the cocoa institutions and agencies engaged during fieldwork for this research. It also gives an account of the issues affecting the institutions in delivering better services to the farmers that are especially aimed at improving cocoa production as well as their general livelihood.

To understand how research, development and extension services in the cocoa industry within PNG are carried out, it is valuable to consider the roles of the major providers of such services. In so doing, while the focus of such services on production can become clearer, the absence of any consideration for smallholder cocoa farmers’ livelihood strategies can also be revealed.

The rationale behind this chapter is to provide an understanding of who does what, especially in cocoa research, extension, and regulatory institutions, and how their functions and roles
affect cocoa farmers in improving cocoa production and their livelihoods. Where appropriate, reference to direct quotes is provided.

9.2 COCOA SUPPORT INSTITUTIONS AND ORGANISATIONAL ARRANGEMENTS

The major institutions/agencies directly involved with cocoa research, development and extension within PNG include:

- The Cocoa Coconut Institute (CCI)
- The Papua New Guinea Cocoa Board (PNGCB)
- NGIP Agmark Company
- East New Britain and Morobe Provincial and District Department of Agriculture and Livestock (PDAL, DDAL)

9.2.1 The Papua New Guinea Cocoa Board (PNGCB)

The Papua New Guinea Cocoa Board (PNGCB) is the state agency mandated and responsible for overseeing the approaches of the PNG cocoa industry to promote its sustainable development. The PNGCB regulates all cocoa licensing for fermentaries and domestic and export marketing. It ensures a robust market so that cocoa farmers receive fair prices for their cocoa, and it controls cocoa quality in order to meet export standards. In recent years, it has moved into cocoa extension programmes throughout the cocoa growing regions, including East New Britain and Morobe Provinces.

The PNGCB is a statutory body that raises its own operating funds through a cocoa industry levy that is imposed on growers, cocoa exporters and processors to fund its recurrent regulatory functions annually. In recent times the Government has been promoting cocoa production by partnering with the World Bank, providing additional funding to the PNGCB for the purposes of the production of improved cocoa seedlings, cocoa extension work, eradication of Cocoa Pod Borer, improving cocoa quality, and increasing overall levels of production.

The PNGCB remits a certain percentage of the cocoa industry levy to the Cocoa Coconut Institute (CCI) for research and extension, as an officer from PNGCB described:

'We collect levies on behalf of the Government; we levy growers at PGK40 per tonne, that’s about 4 toea per kilogram [4 percent]. ... that is how [the] Cocoa Board was set as a self-funding entity where we conduct levy for administrative as well as extension programs. A portion of the levy [about 35.5%] should go back to the CCI for research. We are also funded by government through development budget, unlike the past'.
This support from the government is in line with the cocoa industry’s goal to increase cocoa production to 100,000 tonnes by 2015 (Papua New Guinea Cocoa and Coconut Institute, 2010). Other support includes the PNGCB receiving funding from the World Bank through the Government of PNG for Productive Partnerships in Agriculture Project (PPAP) in 2011.

‘The World Bank and the Government since 2011 under PPAP project has pumped in millions of Kina into cocoa rehabilitation program which supports our programs too’.

The expectation of the Government from investment through the PPAP was to improve the performance of cocoa institutions and to enhance industry coordination in the cocoa sector, generate a productive partnership with cocoa growers, and improve smallholder market-access infrastructure.

While the levy is important for raising funds for industry research and development, its collection is not always well received by farmers. One reason for this could be because of lack of perceived benefits of it, since despite the adequate funding for the PNGCB’s operations, efficient delivery of these programmes and services to the farmers’ cocoa fields is yet to be seen on the ground, as highlighted by an extended comment by an officer within PNGCB:

‘...there is a greater need to address the farmers’ needs, because the government has set [a] cocoa production target of 310,000 tonnes by 2030, under the Development Strategic Plan 2030, in line with vision 2050. Because of that there is great need to expand the organisational structure to deliver the services....(pause)... We are a government body so we are mandated to provide services to farmers. Most times in the past, we do not deliver to the farmers expectations, farmers do not pick up well, uh... so, what I can say is that, the farmers want Cocoa Board to be out there in the rural areas to provide them with technical advice, but often our extension officers including PDAL, CCI officers are not always there. They [farmers] complain a lot because they want the government services to go in, so in the event our officers do go to such unvisited places the officers often get a mouth slashing from the farmers because there is so much demand for services to go out in terms of extension, training on CPB management, or to get the clone variety (seedlings) out there to the farmers’.

In other words, while there is farmer demand for the services, the reliability of the services is quite low, despite the level of investment. Subsequently unreliability can create tension between the farmers and all levels of government support, to the extent that farmers stop listening to various efforts of other support.

9.2.2 The Cocoa Coconut Institute Limited (CCI)

The Papua New Guinea Cocoa Coconut Institute’s (CCI) mandate is to do Research and Development (R&D) in cocoa and coconut production, processing and marketing. The CCI gets sixty percent (60%) of its funding from the National Government and the other forty percent (40%) is funded through a cocoa and copra export levy through the PNGCB and Kokonas Industri Koporaison (KIK), CCI’s own cocoa/coconut plantations, and from donor funding.
The CCI developed its own strategic plan (2010-2019) and this, partially implemented in 2012, was based on the concept of ‘Agricultural Research for Development’ (AR4D). In AR4D, research feeds into development, where research focuses on practical issues that are affecting the cocoa (and coconut) farmers and also seeks to bring some tangible changes to the farmers' way of life. An organisational goal of the institution is ‘improved livelihoods of rural communities dependent on the cocoa (and coconut) sector’. The CCI’s major clients are cocoa farmers, cocoa buyers and exporters, and major plantations, as well as Non-Government Organisations (NGO) who are involved in cocoa extension work.

Research in the past was carried out in the cocoa industry on an *ad hoc* basis without a proper strategic vision. Research direction was largely based on an individual research officer’s research interest or according to the themes of the funding agencies and was often not necessarily based on farmers’ needs. Recent reforms have claimed to bring changes to this situation and resulted in the re-direction of research towards farmers' needs. The situation was explained by one research officer:

> ‘The biggest thing that has happened is the development of the strategic plan. Now our strategic plan is tied to Government’s vision 2050 and to the medium term development plan. Basically, we see ourselves as development players now. Previously we were doing extension and research on an *ad hoc* basis and did not link to any vision. Now we have a direction we see our purpose and mission so our work programme and research will contribute meaningfully toward the goals…. yap, the strategic plan has provided a pathway, and that’s the biggest achievement for the institution since I have been working here’.

The CCI programmes are directed into six thematic areas based on their strategic plans, including: marketing systems, scaling and sustainable production, productivity improvement, information management and communication (extension), regulatory, legal and policy environment, and institutional capacity strengthening.

### 9.2.3 The Provincial and District Department of Agriculture and Livestock (PDAL, DDAL)

The Department of Agriculture and Livestock (DAL) services have evolved with political, administrative, and institutional reforms over the years. The PNG Government’s agriculture policy interventions on decentralisation and corporatisation in 1990, where all powers of agricultural extension work were decentralised to be a function of Provincial Governments, means that extension functions rest with local level government bodies at a district level.

Given the circumstances of successive ineffective government investment in extension related programmes, many non-government organisations as well as statutory commodity boards (e.g.
the Cocoa Board), and private enterprises (e.g. Agmark) have emerged in recent years to provide extension services effectively to the farmers. However, with many players now operating in the extension realm, this situation has made extension delivery more complex for the National Department of Agriculture and Livestock (NDAL) to successfully coordinate, implement, monitor, and evaluate the National Agriculture Development Plan 2010-2016 as well as the PNG Development Strategy Plan 2010 – 2030.

9.2.4 New Guinea Islands Product Agmark (NGIP Agmark)

New Guinea Islands Product Agmark (NGIP Agmark) is one of the largest agriculture companies that has also branched into shipping, trucking, metal fabrication, machinery, hardware and retailing. Agmark is the country’s largest cocoa grower, trader and exporter. It is also involved with the marketing and trading in a range of other agricultural commodities, including vanilla, copra, essential oils, chillies, pepper and other spices. It is headquartered in Kokopo, East New Britain Province and has retail branches in Rabaul, Kimbe, Lae and Madang.

NGIP Agmark is business oriented, thus focusing on buying and exporting cocoa without much consideration of smallholder cocoa growers. Through the years, due to an increase of other competitors, and with fewer production and quality issues, the company has needed to change its style of business to link with smallholder cocoa farmers as partners. This lead to the company providing extension and support services to the cocoa farmers. The company now has a strong extension team who collaborate with other cocoa extension agents from both government and NGOs to address cocoa issues (including CPB).

NGIP Agmark has its own cocoa farmers who register with the company as members and they supply the farmers with fertilizers, pesticides, knapsack sprayers, pruning tools and transport. NGIP Agmark extension officers visit these farmers and provide further technical support such as training, monitoring and evaluating the farmer’s performance in their own field. When farmers harvest the cocoa beans, they are required to the sell to NGIP Agmark, and whatever the farmer owes to the company for services provided is deducted from the value of their gross income, and the net is paid to the farmer. In this way the farmers are somewhat restricted in their ‘freedom’ to market elsewhere (should they so choose), but on the whole NGIP Agmark has developed a good relationship with the cocoa growers, the community and other stakeholders, as one officer explained:
In the past the AgMark branches and agents were only into buying cocoa but now we are into advisory services where we involve some technical approaches. We are grouping farmers, providing them with training, seedlings, and management skills so we feel that we own the cocoa trees and the farmers also feel that these cocoa trees belong to AgMark so when harvesting I must sell them to AgMark. Before we had the mentality that cocoa belong [to the] farmers, we just tap into them to buy cocoa, buy cocoa. We were not concerned and aware of the problems faced by the farmers in growing cocoa. So there was no good relationship with us, they never cared about selling their produce to us and went to other buyers whose prices were better than ours. Or in some cases where we were commenting on the quality of their cocoa, they simply went to other buyers as they accepted their cocoa so we had trouble persuading them to.

In recent times the National Government has recognised the leading role undertaken by NGIP Agmark in cocoa production and has consequently established a partnership arrangement through it to reach the cocoa farmers. Through this partnership NGIP Agmark is able to access funding assistance from the PNG Sustainable Development Fund (Government fund) to extend its extension programs. In recognition of the work done by NGIP Agmark, the Cocoa Board of PNG has partnered with the company to roll out the PPAP project since 2011 and is continuing to play a leading role in cocoa business as explained by an NGIP Agmark Extension Officer:

‘…recently the government has recognised AgMark’s leading role and the government comes in to work in partnership to reach the cocoa farmers. From the government we got assistance from PNG Sustainable Development Fund, and recently on the new project with PPAP funded by World Bank through PNG Cocoa Board. Now we are rolling out or implementing this project so AgMark is playing a leading role in cocoa business’.

The next section presents the cocoa extension approaches practiced by the institutions and/or organisations mentioned above.

9.3 COCOA EXTENSION APPROACHES IN USE

According to past reviews of agricultural extension in PNG (ANZDEC, 1993; Dekuku, Chambers, Pamphilon, Moat, & Komolong, 2005; Sitapai, 2012), and also as revealed in Section 3.3 earlier, there are various extension approaches being used to support farmers in cocoa production. These approaches include: general extension, training and visits, commodity specialisation, participatory approaches, farmer field schools, cost sharing approaches, and so on.

While there is some cross-over of techniques between the various approaches, the reality is that there is no unified or singular extension model that suits all-purposes. Various research and extension agents in PNG have developed relevant or combined approaches to create change but at the same time spend considerable resources on the development of new technology options.
Similarly there are institutions that, have considerably different intents or expectations from using such an approach. Even though they might use the same extension model to approach the farmers. Consequently there appears to be no consistency between institutions, sectors and/or regions, for instance, in terms of the extension approach (method or technique) matching with the extension’s purpose (outcome).

An exploration of the extension approaches in use within the study regions, as revealed by the findings of this research, is now described in this sub-section to illustrate these points. Where appropriate, reference to direct quotes is provided.

9.3.1 Commodity Specialised and Cost-Sharing approach (PNGCB and NGIP Agmark)

The main aim of the commodity specialised approach is to increase production of a specific commodity crop of interest. Organisations that use this approach are mostly private companies motivated to increase production mainly for profits thus they provide extension, research, supply input, and markets for their farmer clients. The two groups with cocoa as the main commodity focus are NGIP Agmark and the PNG Cocoa Board.

The PNG Cocoa Board (PNGCB) deals specifically with cocoa (specific commodity) as a regulatory body and provides extension services, but does not supply inputs (such as chemicals or tools). Its goal is to regulate the cocoa industry by coordinating and monitoring all of the cocoa industry and to increase the overall level of national cocoa production, especially from smallholder farmers. Its model of approach to cocoa farmers was the ‘training and visit (T&V)’ approach until PNGCB received funding from the World Bank through the Government of PNG for the Productive Partnerships in Agriculture Project (PPAP) in 2011, which lead to it ultimately shifting its conventional approach from T&V to a ‘cost sharing approach’ of reaching or connecting with the cocoa farmers to increase cocoa production.

The cost-sharing approach was adapted by the PNGCB in conducting the PPAP for two reasons. Firstly, it wanted to see the farmers take ownership of the project by paying an equity of about ten (10) percent of the total cost required to rehabilitate or replant their cocoa blocks or clearing and planting new cocoa blocks, while the CBPNG assisted with the rest of the costs, as explained by an Extension Officer;
'Oh yes, through PPAP programme a lot of funds have been channelled through by World Bank and PNG Government to improve cocoa. Farmers are asked to put up 10% of the cost of rehabilitating their cocoa block and the 90% is from PPAP funding. Mainly the innovative farmers have come forward with their portion and are doing well in improving their cocoa block. In the partly user pay policy makes farmers to take ownership and work hard. We believe this approach is sustainable in a long run as farmer takes control and ownership rather than the free service mentality from PNGCB.’

The second reason was to see such a programme become a sustainable extension service in the long run. The evidence suggests (Anderson & Feder, 2003; Rivera & Cary, 1997) that when farmers start to pay a small portion for the extension services they receive, they may have a notion of ‘ownership’ and are more likely to implement changes being promoted to them. The longer term intent of this approach is that it is thought to contribute to a sustainable extension service, away from the ‘free service mentality’ that has been in place for so long, without much appreciation by farmers.

Farmer responses to the commodity specialised approach under the PPAP grant system have been mixed. There were those farmers who took the commitment to the cost-sharing approach seriously, recognising the benefits of receiving the associated services such as seedlings, chemicals, tools and training from the CBPNG under PPAP grants. Others meanwhile, while happy to receive the benefits, complained when they were required to contribute their ten percent, arguing that they were unable to meet the equity payment and accordingly did not qualify for the PPAP grant. It’s possible that the user-pays principle, and the manner in which the grant is paid, are perhaps not well understood, as one farmer explained:

‘The World Bank and the Government through Cocoa Board have invested a lot of money into cocoa but we are yet to benefit. Only few farmers who have money make their contributions and the Cocoa Board funds them from World Bank project (PPAP). Many of us don’t have money to start so we miss out’.

The cost-sharing approach extension service may work for the PNGCB in achieving their goals, however, there remain important challenges ahead as almost all farmers are more than just cocoa farmers, diversifying into many other activities apart from cocoa. During this research the project was still in its implementation phase and an evaluation of it is yet to be conducted to establish its success. However, this research suggests that the success of the outcome of the cost-sharing approach may well be determined by farmers understanding the logic behind a user pay system, their willingness to pay their share, and their capacity to move away from the expectation of the traditional ‘free-service’ extension approach, as a farmer expressed:

‘some of us have doubts about the 10 percent of our equity to get extension services as it used to be free. We are not used to this user-pay policy on how it works and the benefits in a long run. Therefore I am reluctant to pay unless I know the benefits’.
The commodity specialised Agmark Company focuses on cocoa as well and so its extension approach is more about training and visit (T&V), although they do provide inputs like cocoa seedlings, fertilizers, pesticides, knapsack sprays, pruning tools, and transport. As previously mentioned, the costs of the inputs are remitted when cocoa is sold to them. This arrangement works out well and it is a kind of cost-sharing approach. Although it is a risky way of investing on smallholder cocoa farmers, the important point is that good relationship management and trust is built into its approaches and line of activities. An Agmark extension officer explained:

‘In the past, we [Agmark] only helped them to transport their supplies to their village and bring their produce to our markets but now we as well provide them with inputs like planting materials, tools, chemicals, training and extension, regular visits and costs are recouped when they sell their cocoa to us. This also strengthens our relationship with them’.

Agmark is also a partner of the PPAP, rolling out the programme in conjunction with its current existing extension approaches.

**9.3.2 Participatory Approach (CCI)**

In recent years, agricultural institutions in PNG have undergone reforms and have also adapted new ways of reaching the farmers effectively through what is known as a participatory approach. The basis of the approach is that agricultural institutions have come to appreciate that knowledge is best gained through participation, interactive processes and networking with stakeholders. The participatory approach used by the Cocoa Coconut Institute (CCI) is known as the ‘Farmer Field School’ (FFS) concept.

The Farmer Field School (FFS) is being practiced by the CCI to improve the level of cocoa farm management practices to specifically minimise production losses due to cocoa pod borer (CPB). Basically the CCI extension officers select a ‘lead’ farmer or someone who might be referred to as ‘model farmer’, someone known to attend intensive cocoa management training provided by the CCI on cocoa management skills, including specific training in integrated pest and disease management (IPDM) techniques to control cocoa pod borer. The model farmer subsequently returns home and organises a cluster of about twenty five (25) farmers around his village. The model farmer then organises his cluster farmers to have learning sessions on his farm, for example, where he demonstrates some of his learnt skills to them. The CCI Extension Officers said,
‘CCI practices Farmer Field School extension approach. We conduct training on farmers’ own farms and other farmers learn from each other. Due to limited staff we rarely revisit and evaluate the outcome’. 

Ideally, CCI staff would continue to facilitate, monitor and conduct future training where the farmers would evaluate their fields and performance over a period of time, but this is often not done.

9.3.3 Conventional Agriculture Extension Approach (PDAL and DDAL)

Conventional agricultural extension is practised by government extension officers from the Provincial and District Departments of Agriculture and Livestock (PDAL and DDAL). It is called ‘conventional’ because it is largely a typical ‘top–down’ approach where the extension officer disseminates agricultural information through direct contact with the farmer or through indirect contact involving intermediaries such as contract farmers (contracted by PDAL to carry out extension) or voluntary organizations (NGOs). Training courses and mass media are also often included, sometimes in association with donor funded projects included. In some cases, extension officers organise farmers into registered cooperative groups when dealing with commodity crops like cocoa, in partnership with commodity based organisations like the CCI, Agmark, and the PNG Cocoa Board.

Through interviews, discussions and observations, it appears that the East New Britain Provincials Government (ENBPG) is competent in delivering vital services to its rural communities and the farmers.

‘The provincial government has developed clear plans and a work structure where provincial and district extension officers are better resourced to carry out their extension duties unlike their counterparts in other provinces in the country. Both Provincial and District Level Government in East New Britain Provincials (ENBP) work with partnerships and collaborate with both private and public research and extension agents (CCI, NARI, Agmark, NGOs etc.) to address farmers’ issues’.

To understand a perspective of this, a quote from an Extension Officer in commenting on the ENB Pro vincial Government functions reveals the depths and importance of the networking relationships:
'I think ENB is quite unique and different from other provinces. There are a number of agricultural institutions established in ENB unlike other provinces e.g., you have NARI, PNGCCI, Vudal University, OSCIA, and Sonoma Adventist College, where they teach agriculture, and others. See there are big institutions here. As well as that, about 80 percent of Provincial Government staff were transferred from provincial to district level about 2 years ago through the local level government reforms. So now the perspective is that more money is coming down from National direct to District level. More specialist people like extension officers and others are coming down to the Districts and closer to LLG, wards and councillors, so this is a good thing. More money, more staff is coming down, but the question is, do we have the right people to deliver the services?.. (pause) The problem is when you don’t put the best people to deliver these services. In terms of coordination, we [NARI] have a very good network and partner with PNGCCI, PDAL, DDAL and AgMark. We have a MOU in place with the Provincial Government to do joint research work. We meet quarterly with stakeholders to carry out our delegated programmes. Therefore, you see these connections linking up one way or another ha. So, we are working very closely and I think this area you don’t find in other parts of the country. Our connections are strengthened by Provincial Government, like having meeting quarterly. That’s how we get to know each other'.

In Morobe Province, the Local Level Government reforms are yet to be implemented. The District Headquarters are poorly resourced for government officers to deliver services effectively. Most officers live in Lae city and travel to the districts such as Wampar once a week or fortnightly. They no longer visit the farmers in the villages, but expect the farmers to visit them as they don’t have accommodation, adequate manpower, or sufficient logistical support to carry out normal extension activities. For example, an extension officer stated:

‘Currently I am based at Wampar LLG but I don’t have housing at the station so I live in Lae and travel up this way. It cost me K10 to travel on public transport so I do not come here often because it is too far and expensive for me to travel daily. I probably come to work 2 or 3 times a week. I do not even have wheels like a motorbike to move around to do my extension duties. When I am at the station, I remain and farmers who need information come to see me at the station or sometimes they come and report and only when I have transport I would visit them’.

Apart from logistical constraints, it was apparent that most Provincial and District Extension Officers of Morobe Province do not have a good working relationship or partnership with the National Agriculture Research Institute (NARI) in Lae. It appears that in many instances, the latest agricultural research information and technology developed by NARI does not reach the Provincial or District Extension Officers. Most Extension Officers often depend on outdated textbooks or information learnt from college as a source of knowledge to develop training and farming material for farmers that is not always suitable to farmers’ settings and environment. Often farmers lose interest and do not trust the Extension Officers and projects fails, as one farmer explained:

‘The extension officers under Wampar LLG never come to give advice or to collect the views of our problems... we are left out. We don’t trust them now’.

Indeed it appears that the Provincial and District Department of Agriculture and Livestock (PDAL, DDAL) structure and extension system in Morobe (and other provinces) has perennial problems with poor service delivery.
The next section presents the cocoa research and development in PNG based on data collected from fieldwork, with many other quotes of similar reference being revealed through the research investigation.

9.4 COCOA RESEARCH AND DEVELOPMENT

The Cocoa and Coconut Institute (CCI) is important to cocoa (and coconut) research, development and extension in Papua New Guinea. The head office of the CCI is at Tavilo near Kerevat, in East New Britain Province, with its branches in New Ireland, Morobe, Madang, East Sepik, and Central Province. The CCI’s main concern is to undertake relevant research and extension programmes in order to develop appropriate cocoa farming systems and improve technologies to enhance smallholder farmers to increase cocoa production.

The institute has researched various aspects of cocoa in breeding, agronomy, soil, entomology, pathology, post-harvest, and recently in socioeconomic studies, to improve cocoa production. Various cocoa technologies were developed over the years such as GS2 hybrid cocoa clones, cocoa farming systems, and improved post-harvest practices. The Cocoa Breeding and Agronomy Section of CCI conducts research and field trials to improve the cocoa hybrids and management techniques. The research feedback suggests that the cocoa clones or hybrids that have been developed are pest and disease tolerant, producing beans of premium quality, and high yield; however, they only have a maximum yield of up to five years. That means yield would decline after five years, so the farmer needs to replant, usually at a significant financial burden for the farmer.

During the time of the research there was much discussion about Cocoa Pod Borer (CPB), a disease that had a significant impact on the industry in years past. The CCI led a collaborative effort to eradicate CPB. Indeed, CCI invested considerable resources into cocoa husbandry and management techniques to develop and package information into three different approaches from:

- no input, manual input (basic pruning, upkeep)
- high level input (weed management, pruning, upkeep, fertilizer), and
- intensive management (all manual inputs, weedicide and pesticides, fertilizer etc.).

Farmers opt to adopt whichever approach suits their convenience.
Some farmers commented that they had blocks with Cocoa Pod Borer (CPB) tolerant clones, while others were beginning to replant the improved variety. However, both the farmers and cocoa extension agents stated that there is a huge shortage of CPB tolerant seedlings as the demand is high.

... 'we arrange our own transport to go and collect hybrid cocoa seedlings from CCI but they have no cocoa seedlings, they (CCI) tell us there is no planting material'.

and

... 'the problem is making these planting materials (CPB tolerant) available and accessible to farmers because of low supply and many other factors'.

Even just growing a CPB tolerant variety would not eradicate CPB disease. Eradication also requires high inputs and constant cleanliness (weeding, pruning, remove diseased pods etc.) to minimise incidence. In other words, more time, labour, and resources are required in controlling CPB in order to increase production. This is a challenge to farmers who mostly have scarce labour and resources.

However, in recognising the importance of cocoa and the effect of CPB on cocoa production, the Government sought funding (US$23.13 M) from the World Bank and the International Fund for Agricultural Development (IFAD) and invested highly in the cocoa industry through what was loosely referred to as the productive partnership in agriculture project (PPAP) (DAL, 2010).

9.5 COCOA PRODUCTION AND MARKETING

The Cocoa Board of Papua New Guinea (CBPNG) regulates the licensing of fermentaries (wet bean buyers), dry bean buyers, and cocoa exports. The licensing requirement for a fermentary is such that the farmer must own more than 1300 cocoa trees (at 4 x 4 metre spacing – approximately 2 hectares) and the design of the fermentary and/or drier has to comply with Cocoa Board of PNG specifications. These requirements are arduous for most smallholder farmers who own less than two hectares of land, besides, they lack credit facilities to obtain funds to buy materials for their fermentary house. Some farmers meet the requirement, but the licensing officials at the CBPNG do not issue licenses for unknown reasons. The impact of this on a farm’s financial performance can be considerable, as one farmer explains:
One of the major issues we are facing is we don’t have cocoa fermentary in this village. All of us are growing cocoa, but we don’t have fermentary to cure our cocoa beans. We have almost 4000 – 5000 cocoa trees here, but we don’t have fermentary. I have applied for a license and [been] waiting for years. We have to travel to Gabsongkeg or 40 Mile to sell our wet beans. When we request the buyers to come and buy wet beans at our village, they always come [a] few days later and our cocoa beans ferment and reduces weight. We are paid by weight and obviously we make a loss as weight of our beans reduces. If only I own a fermentary then will sell at a higher price and be happy. Cocoa is hard work, but we are selling cocoa as wet beans at low price, very discouraging.

The market price per kilogram of dry bean is normally four to five times higher than that of wet beans. For example; during the time of this research (May 2014), wet beans were selling at PGK1.80 per kilogram while dry beans at PGK8 per kilogram. Despite the high price for dry beans, most of the farmers sell their cocoa as ‘wet beans’ to dealers, while a few who have cocoa fermentaries (who are often also dealers) sell cocoa as dry beans due to some of the factors stated above.

Meanwhile, the impact of wet vs dry beans is not the only issue, but also extends to pest control. Therefore, most farmers in Burit and Vudal took CPB as a challenge, working hard to rehabilitate their cocoa blocks to reduce the occurrence of CPB. As one farmer said:

‘Cocoa pod borer is a disease for lazy farmers, if you don’t manage your cocoa block the CPB will live with you. If you can work hard and manage your block to keep away CPB you will still produce good quality and quantity of cocoa’.

Nevertheless, others are sceptical after the devastation of the CPB infestation that destroyed all their cocoa trees. They have diversified into other income generating activities, for example, marketing garden crops, saw milling, and paid labour with outside organisations. As one farmer said:

... ‘So I am interested in sawmilling simply because there is very good income. Cocoa is okay, but after the experience of CPB I am reluctant to concentrate on cocoa again’.

The farmers in Wampup and Gabsongkeg villages are continuing to grow cocoa, but they are also committed to other income generating activities such as chicken farming, cattle ranching, selling garden produce and seeking employment as paid labour.

9.6 COCOA PARTNERSHIPS AND COLLABORATIONS

Like other sectors, the emerging theme of partnership and collaboration is crucial in cocoa research, development and extension. Since the establishment of the cocoa industry, there has been an increase in partnerships and collaborative research by CCI with national and
international organisations. The national collaborators have been discussed in the above sections.

The international collaborators are mostly donors involved in research such as cocoa breeding. For example, CCI has previously participated in an internationally co-ordinated cocoa clone test trial funded by the International Cocoa Organisation (ICO). Meanwhile, the Agricultural Research Centre for International Development (CIRAD) has previously provided technical expertise in Plant Pathology, the Australian Centre for International Agricultural Research (ACIAR) has funded a number of collaborative projects in cocoa quality, plant pathology, soil nutrients, and socio-economic research with numerous partners of Australian Institutes and Universities has been undertaken.

There is considerable positive cocoa research and development work undertaken by respective institutions, however, there are challenges and issues encountered which are presented next.

9.7 CHALLENGES AND ISSUES

This section presents a range of issues that are affecting the function of research and extension systems in PNG thus reducing the effectiveness of their delivery of vital agricultural services to rural farmers aimed to improve their livelihood. Some of these factors directly or indirectly affect farmers’ livelihoods, as insufficient attention or assistance is received by farmers from the enabling agents and service providers.

9.7.1 Government Decentralisation (Reform)

Government reform in decentralising the extension system from a provincial to district level has created confusion in providing directives and reporting to a central command station. At the district level, Agriculture Extension Officers report to the District Manager on their activities, and receive no instructions or directives from Agriculture Advisors at Provincial Headquarters. Technically, there is no structural linkage between the National Department of Agriculture and Livestock (NDAL) to Provincial and District Departments of Agriculture and Livestock (DAL). To make the system more complex, the District DAL officers do not report to the Provincial DAL but to their District Manager who is an administrator with limited technical background in agriculture. Given this circumstance, it appears that there is no proper structure and linkage to see a flow of activities from planning, implementation, evaluation and reporting. Although the
Government decentralisation reform was intended for better service delivery to the rural communities, there are impediments still to effectively reaching the rural farmers through public extension services such as funding and reporting processes, as alluded to by an extension officer:

‘The decentralisation reform system and with new reporting structure isolates us from coordinating with national and district level Agriculture that affects service delivery. Districts and LLG Extension Officers report to their District Manager (not agriculture trained) and they see them as their bosses and not come to us in the provincial level for instructions. Even the fund goes direct to district level and not through the provincial Agriculture Department as it used to be. This is affecting our services delivery’.

Government reform in decentralisation creates confusion, and vital agricultural information from the village to the district level does not reach the policy makers at the national level. There are also weak links between research and extension services. The National Agriculture Policies are often drafted based on desktop studies, quick surveys, and consultative workshops often facilitated by foreign experts with limited local knowledge. Day to day data and reports from the district level do not reach the provincial or national level.

9.7.2 Lack of Funds and/or Funds Not Readily Available

The release of the budgetary funds from the National Government to Provincial and further to District and Local Level Government are often delayed and do not reach the local level in order for the Extension Officers to carry out their duties. For example an extension officer explained:

‘We have plans to develop the rural areas, especially farmers, but there are times we have delays especially the Government system of funding. We normally receive our funds by June, July and not enough time to go out to implement our programmes and project plans, the funding comes in late. There are holdup in our plans because we are interrupted with unavailability of funds when we need it most to complete the project, and so all projects collapse. We have a problem with the funding system’.

Not only are there delays in the release of budgetary funds but often the funding is inadequate to support the programmes and logistics.

‘Government is funding us but we are not receiving funds on time and also the funding is not enough to meet all needs’.

9.7.3 Inadequate Manpower and Support

The ineffective ability to respond to and implement technical assistance is often associated with inadequate manpower and support. Relatively there is a low level of public investment in infrastructure such as staff housing, laboratories, and equipment.
In the case of the CCI, the turn-over rate of the CEO has been very high over recent years and this creates unstable management to successfully implement and manage the cocoa research and extension programmes. As well as that, the reforms within the context of the agricultural research for development (AR4D) under the strategic plan, require more scientists and extension officers and more provision for spending on operations and maintenance. Despite the new reforms with targeted programmes, staff turnover has been high largely, it has been suggested within this research, due to political influences. As said by a research officer:

'The institute is best set to serve the rural communities, and it’s rightly so, but again [there is a] politic part of it, the people involved in the industry from the minister down to Board, and even down to the CEO. This institute has a highest turnover of CEOs where CEO continues to change every one year. Currently we have acting CEO and the Board meets on the 27th of this month, maybe we will advertise for CEO position again'.

The associated loss of momentum in staff delivery has reduced the effectiveness of the coordination and implementation of the CCI programmes, including delivery of extension services to the cocoa farmers. The CCI has had to work hard to build the trust and confidence from the Government, the PNG Cocoa Board, other national agricultural research systems (NARS) institutions, and importantly the farmers.

9.7.4 Poor Institutional Collaboration

Although the private and public research and extension institutions collaborate in respective cocoa projects to some extent, there is no proper coordination, and various agents are often carrying out the same programme targeting the same farmers. For example, currently the Cocoa Board of PNG and CCI had their own extension services and were rolling out their own cocoa programmes but were often dealing with the same cocoa farmers. This results in the duplication of some services whilst there is often no service in another. For instance, information from research institutions sometimes never reaches the extension system that is supposed to impart the information to the farmers. Hence, an extension office pointed out:

'One issue here is to connect research with extension. The researched information from NARI or CCI is not coming to us. There a little information coming through to us. If we can work together in identifying problems and they do research and we are well informed, [that] would enhance us to disseminate accurate information to the farmers. Currently we are not working together. Therefore by looking at it we are doing far less and farmers are on their own'.

9.7.5 Lack of Socio-cultural Research

Much of the technical and socio-economic research in the past has been conducted in order to increase productivity and thus has been capitalist based (focused on economic improvement),
However, there is a gap in socio-cultural research to fully understand farmers, their way of life, and the choices they make. Farmers are the main cocoa producers and little work has been done to understand them in order to implement appropriate intervention by enabling agents, as mentioned by a research officer:

‘We lack socio-cultural research to understand the smallholder from [a] socio-cultural perspective and to see how economists understand the social aspects to blend socio-economic together as to advise our mother boat, the PNGCB and KIK, to look into policies and regulations’.

9.7.6 Poor Adoption of Cocoa Technology

The extension services and approaches to farmers by both public and private extension agents vary with some success stories, but most cocoa technologies are not adopted successfully by farmers. For example an extension officer explained:

‘Basically if you look around, many of our farmers have very little knowledge about this institution and technology we develop...ah when we released first cocoa clones in 2000, we did model farms based on NARI’s model. So we went out to the villages and selected leading farmers and we continued to make awareness and established 10 model farms. and after 10 years (in 2014), one of the areas I visited thinking that the information imparted was implemented but when I went there I found out that they were way back’.

Even the hybrid cocoa clones which are tolerant to CPB have not been distributed to most needy farmers as there is a lack of cocoa seedlings. For example a farmer said:

‘...but our main problem is cocoa seedling as CCI does not produce enough cocoa seedlings to supply us’.

The challenges range from managerial problems to policy and/or technical issues. Some are of the view that managerial issues can be addressed if qualified personnel with a vast understanding of the RD&E of cocoa lead the industry and other policy issues can follow suit. Moreover, the government in recent years has prioritised cocoa and will continue to invest more money into cocoa for the next decade. Therefore, the cocoa industry has the opportunity to address some of its current issues and constraints in order to increase production and create a better outcome for the growers and to sustain the industry. More study needs to be carried out to understand farmers and their role in cocoa production. The findings of this study may shed some light in this regard.

9.8 CHAPTER SUMMARY

External factors such as enabling agents and service providers across extension and research institutions and agencies impact on farm production and farmer livelihood. This chapter
presented a synopsis of the cocoa extension and research institutions and their approaches to the farmers. It further described the cocoa research and development work carried out by research and extension agents and the challenges and issues confronted.

This chapter began by describing the organisational structure of the cocoa research and extension organisations and the role they play in cocoa development work. The organisations described were:

- the Cocoa Coconut Institute Limited (CCI) with the role of cocoa research, development, and extension,
- the Cocoa Board of Papua New Guinea (CBPNG) which regulates the cocoa industry in terms of licensing (fermentaries, buying, exporting), monitoring quality and production. They collect levies to fund research through CCI, carry out extension activities, and report to the Government on cocoa issues,
- the Provincial and District Department of Agriculture and Livestock (PDAL, DDAL), that are government extension agents who carry out training and general conventional extension services,
- NGIP Agmark, a commercial entity that grows, buys, and exports cocoa. It also provides extension services and farm inputs to its member farmers in East New Britain Province.

The chapter then described the extension approaches accommodated by the research and extension organisations mentioned above. The PNGCB and Agmark have adapted a specialised approach extension model, with their main desire being to increase cocoa production which is the specific commodity crop of their interest. The CCI practice a more participatory model of approach with the ‘farmer field school’ (FFS) concept. The conventional agricultural extension approach is practised by government extension officers from the Provincial and District Department of Agriculture and Livestock.

The chapter further described the cocoa research and development work carried out mainly by CCI and PNGCB. Most research work on technical aspects of cocoa is aimed at improving cocoa production. The chapter elucidated the cocoa production and market issues, and outlined the important partners and collaborators in cocoa research, development and extension work. The chapter finally marked out the challenges and issues confronting the cocoa sector.

The next chapter discusses the factors affecting farmers’ livelihoods and cocoa production.
10 CHAPTER TEN: FARMERS’ LIVELIHOOD AND MERGING INSIGHTS TO KNOWN THEORIES

10.1 INTRODUCTION

The previous three chapters (7, 8, and 9) presented the key themes of the research findings. These included: the human settings of the study areas; assets and farmers’ livelihood strategies; and the influence of enabling agents (government) on cocoa production, including the limitations of its services for cocoa research, development and extension. This chapter seeks to explain the context of these key findings (chapter 7, 8, 9) and the associated factors that affect both the farmers’ livelihood and their cocoa production in the Wampar and Tolai communities of Morobe and East New Britain Provinces of Papua New Guinea (PNG).

This study has established that farmers are affected by both internal and external factors when it comes to their choices in life and decisions they make to enhance and sustain their livelihoods. In order to understand these factors, the previous three chapters (7, 8 and 9) provided a deeper understanding of smallholder cocoa farmers, what resources or assets they have access to, and how the enabling agents operate and provide services to them.

This discussion chapter begins by describing the conceptual framework for understanding the importance of livelihood strategies as they relate to farmer decision-making in cocoa production. Within this framework the internal and external factors previously identified as contributing to a livelihood perspective are captured and contextualised, including: availability of and access to assets (natural, social, human, financial, physical), culture, livelihood diversification and the influence of enabling agents.

The merging insights of the findings are further linked to known theories and models, before the chapter ends with a summary.

10.2 CONCEPTUAL FRAMEWORK FOR LIVELIHOOD STUDY

In conceptualising an initial framework for this research, the sustainable livelihood framework from IMM (2008b) was adapted (see Figure 4.2) to a modified version of the sustainable livelihood framework (see Figure 6.1) to grasp the dimensions or key variables of the research. Subsequent analysis of the findings of this research, also revealed some elements that were
relevant to Maslow’s ‘need theory’ (Maslow, 1970), Glasser’s ‘choice theory’ (Glasser, 1999) and Rogers’ ‘farmers’ decision theory’ (Rogers, 2003). In considering these elements and the associated theoretical models (Maslow, Glasser, and Rogers), a modified conceptual framework for understanding the factors influencing a smallholder cocoa producer’s livelihood (Figure 10.1) could be developed. This framework incorporates the various factors emerging from the findings (Chapters 7, 8, 9) that impact on farmers’ decision-making and livelihood activities, including:

i. Government, and other enabling agencies and service providers,

ii. Capital assets (natural, human, financial, social, and physical),

iii. Culture (wantok system, religion, traditions, beliefs, land tenure, norms and values),

iv. Farmers’ motivation, needs and choice or priority,

v. Farmers’ awareness of vulnerability, risks and opportunities, and

vi. Farmers’ desired outcomes.

The above factors influencing farmer-decision making were driven from two main sources, as described within the findings chapters. The first source refers to the externally driven factors and was revealed to include system processes such as capital assets (social, human, financial, natural, and physical), enabling agencies and service providers, and associated vulnerability or risk factors connected with such services. The second source of factors arises internally from within the farmer, largely as a consequence of farmer traditions, motives and cultural factors including beliefs, norms, values, religion, the land tenure system, experiences and the goals they pursue in life.

Each source has a strong influence on how a cocoa farmer’s livelihood is shaped. The first source has a predominately structural influence (or in the case of vulnerability and risk, an influence associated with structural elements) and consequently is heavily influenced, in turn, by the role of Government and other structural investors. The second source is heavily influenced by tradition and culture, and its importance is underlined by the fact that even when an individual farmer may be ‘disconnected’ from government or other structural influences, this same individual is invariably influenced by tradition and culture by virtue of the lifestyle, even livelihood, they possess and demonstrate.

These factors have been brought together, as they relate to their influence on an individual farmer’s cocoa production, and conceptualised in the Agricultural-Based Sustainable Livelihood Framework (ASLF) as presented in Figure 10.1.
10.2.1 ASLF and Livelihood Diversification

In accordance with the literature (Chambers & Conway, 1992; Ellis, 2000a; Karim Hussein & Nelson, 1999), livelihood diversification has been described as ‘combining a range of occupations to construct a diverse portfolio of activities’. From the perspective of smallholder cocoa farmers (see Chapter 8), despite a range of activities being carried out, a single livelihood strategy is identified, where the emphasis is on ensuring they survive, improve their standard of living, and uphold their cultural norms and goals. Farming is only one of these activities and as the data suggests, not necessarily the most important activity. Various elements influence activity choice, as illustrated in Figure 10.1. For example, some farmers are more aligned to ‘modern cocoa production intent’ than others, while others are more committed to church responsibilities.

A farmer’s livelihood strategy encompasses not only activities that generate income but many other kinds of choices, including cultural and social choices, that come together to make up the primary priority of a household. Different farmers have different priorities, different understandings and perceptions of what is important, different values, different problems and different ways of working depending on their history, locality, customs, norms, cultural values
of where they originate from, personal and community assets, and so on. However, there are some commonalities in the choice of their activities and expected livelihood outcomes. For example; most farmers want to increase their well-being, improve food security, have better health and education, and also seek recognition and gain prestige or social acceptance (see Figure 10.1).

This study acknowledges the previously reported theoretically sustainable livelihood approach framework (Chambers & Conway, 1992; DFID, 1999; Ellis, 2000a; K Hussein, 2002; Karim Hussein & Nelson, 1999; IMM, 2008b) (see Figure 4.2), particularly the five livelihood assets (human, natural, finance, social, and physical) and the vulnerability aspects that are believed to influence households in the way they undertake certain livelihood strategies. However, the findings of this research also provide additional and specific attributes not previously encapsulated within earlier theoretical positions. These factors, captured within the ASLF, include the context of farmers’ motives and needs, culture, availability and accessibility of assets, influence from enabling agents and service providers, wariness of risks and opportunities, and how the relationship between these factors lead to certain priorities or choices being made (including cocoa production) in their livelihood strategies.

The Agricultural Based Sustainable Livelihood Framework (ASLF) (Figure 10.1) differs from the conventional theoretical livelihood framework (Figure 4.2) that was specifically designed to study poverty alleviation. The ASLF integrates the livelihood concept with behaviour-dependent variables that influence the households (farmers) in making certain decisions in undertaking the type of activity they believe will improve their livelihoods, specifically in a Papua New Guinea (PNG) context (although the activities and interactions may vary from district to district). Thus, the ASLF can ideally be used by researchers and extension agents in studying the livelihood of other communities in PNG or as a model for determining a targeted and strategic extension approach.

The next sub-section presents how the ASLF (Figure 10.1) can be used as a framework by enabling agents to facilitate research, development and extension (RD&E) as they have not been carried out in the past.
10.3 APPLICATION OF ASLF AS A FRAMEWORK IN RESEARCH, DEVELOPMENT & EXTENSION (RD&E)

Both public and private Agricultural RD&E systems in PNG have been supporting and facilitating farmers’ engagement in agricultural activities to solve problems and to provide information, skills, and technologies to improve farmers’ farming practices and to increase production. Thus, it is important that RD&E agents, in planning interventions toward cocoa production improvements, understand the dynamics of the farmers’ way of life, the internal and external factors affecting them, and to have a holistic view of the farming community before any interventions are planned or developed. The conventional RD&E approaches (see Section 9.3) may not be appropriate for examining the farmers’ livelihood as they don’t consider internal and external factors influencing the farmer activities. The use of the ASLF offers an opportunity to improve intervention outcomes.

The ASLF is a useful vehicle for considering all these factors. ASLF is almost a checklist through which all RD&E enabling agents, regardless of their background, can understand that there are many things about a farmer’s way of life (see Chapter 7) that influence what farmers do, including their access to different types of assets (see chapter 8) and their use of, or access to, external influences (see chapter 9). Thus the ASLF becomes a guide for successful change in the future. An examination of how an ASLF might create such change is now considered against each of the influencing factors.

10.4 INFLUENCE OF ENABLING AGENTS AND POLICIES ON FARMERS’ LIVELIHOOD AND COCOA PRODUCTION

Farmers depend on various service providers (government agents) to provide them with vital goods and services (electricity, roads, water, education, etc.) that they need for their livelihood activities. Chapter 9 outlines some key challenges and issues that hinder the delivery of services to farmers and rural communities. This section further summarises these challenges as they relate to the efforts of agencies involved in research, development and extension (RD&E) and basic service delivery.

10.4.1 Flaws in the Government Reform Systems

The PNG Government is a key enabling agent influencing cocoa production and rural investment. As identified in Section 9.7.1 there are flaws in the government reforms as a result of
decentralisation of powers down to district level. The purpose of decentralising the powers from Provincial level to Local Level Government was to improve vital services being delivered directly to the rural population at a district level. However, in the process it appears that goods and services intended most for the rural areas of the study areas do not reach them. There are a number of reasons for this.

10.4.1.1 Funding Arrangements
Firstly, funds to support research and extension service delivery are not adequate and/or not readily available at the district level when required. Increasing agricultural productivity is often challenging and typically requires the adoption of improved technology. It requires research and extension systems to develop and impart such improved technologies to the farmers. However, the research and extension agents and agencies are often confronted with challenges and constraints.

As noted in Section 9.7.2, a lack of adequate funding and poor governance and management impacts heavily on research and extension efforts. Even when funds are available, the release of the budgetary funds from the National Government to Provincial and further to the District and Local Level Government is often delayed and does not reach the local level in order for the extension workers to carry out their duties. Consequently the ability of staff to respond to and implement technical assistance is limited and often associated with inadequate manpower and transport.

Such circumstances make it difficult for essential services such as extension advice, electricity, water supply, roads, health services, education, credit and market facilities, etc., to reach the bulk of the disadvantaged rural farmers and their communities. This seems to contribute to less productivity and affects farmers’ wellbeing and livelihoods.

10.4.1.2 Communication and Reporting Arrangements
Secondly, as this study’s findings in Section 9.7.1 suggest, intra government agency relationships are dysfunctional. In particular, the National Department of Agriculture and Livestock (NDAL), the Provincial Department of Agriculture and Livestock (PDAL), and the District Department of Agriculture and Livestock (DDAL) appear unable to effectively collaborate in the interests of farmers and rural communities. The NDAL plays an overall role in coordinating and monitoring
the implementation of the National Agricultural Development Plan (NADP) to ensure that the programmes and projects are successfully implemented. However, under the structural reform arrangements, they have no direct control over the Provincial or District Departments of Agriculture and Livestock functions, especially with respect to communication and reporting. The communication or reporting challenges include the following:

- at the district level, the DDAL Extension Officers report to the District Manager (often non agriculturalist) on their activities and receive no instructions or directives from agriculture advisors at PDAL Headquarters,
- technically, there is no structural linkage between the National Department of Agriculture and Livestock (NDAL) and the Provincial and District DALs,
- there is no proper structure and linkage that might provide a flow of activities from planning, implementation, evaluation and reporting, and
- programmes and projects are generally carried out on ad-hoc basis.

To address the ongoing communication and reporting concerns, the Government decentralisation reforms need to redefine and link the channel of communication from the National to District level, and ensure directives and reporting protocols are made practical and functional. Otherwise, public extension services to the rural farmers and the associated rural communities will remain dysfunctional.

10.4.1.3  Suitability of Local Enabling Agents

The village Councilor plays a key role as an enabling agent in the development of the community and has bearing as a government agent within the current reforms. As detailed within Appendix 7.2, most Councillors are uneducated, partly because in the past, community members have seen fit that traditional village elders or a wealthy person in the community should hold such a position. Even an educated person perceives that competing for a position of village Councillor is degrading to his status. This study suggests that few Councillors are sufficiently skilled in areas of service delivery, critical thinking or creativity necessary for such a role. Furthermore, few, if any, have a demonstrated capacity to collaborate and network with other service providing stakeholders to foster better community services, thus limiting the potential influence government enabling programmes could have in many communities.
Livelihood perspectives are influenced by assets (see chapter 8). The individual is affected by their access to livelihood assets, which come in the form of different types of capital (including natural, social and financial). This study has revealed that there are many different types of assets impacting on a farmer’s livelihood perspective, from community to individual based assets. Farmers have combined the assets in many different ways to generate positive livelihood outcomes as no type of asset on its own is adequate to provide all the desired livelihood outcomes that farmers seek.

The assets differed across all study sites based on availability, accessibility, desire of usage, and vulnerability. There was a wide variation in assets (community and personal) that make up livelihood capital, from tangible stores such as food stock, personnel effects, tambu (Tolai traditional money), cash or savings in the bank (if any), and resources such as water, land, forest, crops, sea (for Vudal village), livestock, farm tools, and machines. The intangible assets are those called upon on demand at times of stress, shock or when contingencies occurred such as during the devastation caused by cocoa pod borer (CPB) on cocoa in Burit and Vudal villages and betel nut destruction in Wampup and Gabsongkeg villages.

Farmers’ accessibility or opportunities to obtain information and technology, use government services such as roads, electricity, education, health, markets, credit facilities, and so on, are also examples of intangible assets. The combinations of all these assets shape individual livelihood perspectives and are now discussed further.

### 10.5.1 Natural Assets

According to the findings presented in Section 8.2.1, the Tolai and Wampar villagers have deep connections to their natural environment as they derive all or part of their livelihood from resource-based activities, with little or no government support to subsidise their cost of living. Of all natural resources, land is the most important asset across all study sites; most of it is customarily owned and has economic as well as social, cultural, and spiritual significance. Nevertheless, over the years, as the population has increased, so too has the pressure exacted on land (soil), water, and forest usage.

Most farmers in Vudal, Burit and Gabsongkeg villages (except Wampup) own less than two (2) hectares of land. Continued land use has depleted the soil nutrients and fertility due to regular
cropping with fewer fallow periods, thus reducing overall crop production (and farmer’s livelihood). Some farmers have consequently focused on non/off-farming activities. An understanding of the types and standards of natural resources and their availability and value to farmers’ would be useful information for subsequent intervention by research, development and extension (RD&E) agents, to help such agents in planning and prioritising how to best support farmers in terms of natural asset management.

10.5.2 Social Assets

Social assets relate to the way people live in a society and in this study, particularly across the various study sites. This research has revealed there is considerable pressure on individuals to behave and communicate in certain ways deemed acceptable by society, and this is often linked with their culture.

10.5.2.1 Language

The most important social factor that connects all members of a society is their language (see Chapter 7). The Burit and Vudal people (Tolai) speak ‘kuanua’ while Wampup and Gabsongkeg (Wampar) speak ‘wampar’, which are their native languages. However, all societies are able to speak and understand ‘pidgin’. Language is not only a means of communicating, but it forges friendships and cultural ties that bind the entire society in a clique. ‘Wantok’ is a term used in reference to anyone who speaks the same language, who often comes from the same area, and who has common social associations or ethnic background. The speaking of the same language creates a social web called the ‘wantok system’ which adds more significant value to that particular society, built on principles of caring and sharing for each other, and forming a culture of being responsible and supportive. Since there is a lack or poor government services in those communities, the ‘wantok system’ is the key driver of the social organisation and structure, where members of the community help each other in terms of labour, food, security and support, even to the detriment of their efforts of their own cocoa production.

10.5.2.2 Religion

Papua New Guinea is a Christian country and so religion plays an important role in society. The study revealed (see Appendix 8.2 for extended details) that farmers spend a considerable amount of time, money, and labour in doing church activities. They are involved in building new churches, spreading gospels, contributing to church rituals, ceremonies, and expenses, both in kind and in cash. The farmers feel it is worthwhile being involved in church activities, as they
believe that more blessing is likely to be received through participation, thus creating prosperity within their family. Consequently substantial time and resources are geared towards church commitments, often at the expense of cocoa work and other farming activities. It was also apparent (see Appendix 8.2, Box 8:2) that men attend to maintaining other social assets such as community meetings, training, or village court hearings, often meaning that women bear lot of the burden of doing both garden work and household chores.

Cultural obligations have to be stable and it is the responsibility of each member or family in the community to attend to and maintain the relationships. The study indicated (see Appendix 8.2) that equal or even more time and resources are committed to socio-cultural obligations than to farming (including cocoa). Thus it is important that enabling agents be mindful of these issues when approaching farmers so as to engage the social interest of the farmers while at the same time addressing production issues.

10.5.3 Human Assets

The human capital of any society is paramount as it takes people to bring change to the community. Human capital includes knowledge and skills, labour, and good health that enables prosperity in various livelihood strategies. In general, most of the populations in the study area are educated somewhat. However, a lack of financial capital, structural investment and government direction and support reduces their potential for creating other income generating opportunities. There are simply not enough jobs being created. Consequently, much of the youth in the study sites are enticed into crime, alcohol and drug abuse, causing social unrest, something believed to be common throughout the country.

Despite the apparent lack of government investment into economic growth, some farmers are risk takers, self-starters and individually innovative with diversified income activities. They are the leading farmers who have a range of past working experience, and took up farming later in life. Farmers who have always been farmers and lived full time in their villages are quite traditional and maintain their conventional way of dealing with farming and cultural commitments. For farmers in the community to improve their lifestyle and to keep up with the modern changes, they need to be exposed to other methods of production and income generation by some form of training.
To improve the human assets, and to generate a more creative community in terms of food production and farming methods, it is important for service providers/enabling agents to take more account of existing culture, traditions, customs and livelihood perspectives that exist within that community. Only then will they able to recognise the foundation of such human assets and identify ways and means of designing programmes that community members can easily relate to relevant to their existing livelihood perspective.

10.5.4 Financial Assets

The DFID (1999) defined a household's financial assets as the “availability of cash or equivalent, that enables people to adopt different livelihood strategies.” In Section 7.8 it was revealed that the village economy, in terms of cash and non-cash assets, plays an important role in sustaining and improving farmers’ livelihoods for Tolai and Wampar people. The study indicated that most of the income was through farming activities (cash crops, food crops, and livestock), although people also make their earning from other sources. Moreover, cocoa was grown by most farmers in the study sites but it was not the only cash crop as there are other cash crops like coconut and betel nut. People in all study sites also diversify into different sources of making an income (selling handicrafts, receiving remittances, undertaking paid work, setting up small businesses and so on) apart from farming. While the money earnt from such activities was minor and its use dedicated mainly to household expenses, there was no hiding the reality that families considered a range of income sources to fund their livelihood, other than just cocoa - and in some cases cocoa was less important than other crops such as betel nut.

10.5.4.1 Stored Assets

Farmers do not always have cash on hand, but often have financial assets in a non-liquid or stored form. This is because money is not needed daily for bills, rent, transport, groceries, fuel and so on as the people live in villages with free housing and few bills to worry about except food, clothing and other life supporting needs. Money is only required if they are travelling to town or when the need arises (food and condiments) perhaps once a week.

Secondly, the markets used to sell their crops or livestock are often a reasonable distance away, or the prices are often so low that farmers will wait quite some time to sell their produce and consequently they do not receive cash for goods sold on a frequent basis. Thirdly, it is risky to
carry cash because of the risk of theft, and banks are too far away to make deposits and in some cases, some farmers do not actually have bank accounts.

Finally, the number of non-liquid assets (livestock, cocoa trees, and so on) a farmer owns also determines his/her status in the village more than merely cash in a bank account. The culture has the philosophy of ‘seeing is believing,’ so having more money in the bank would not elevate one’s status in the community until and unless the person converts their cash into material assets and makes contributions towards cultural obligations with the money. Nevertheless, vulnerability is considerably high as there is no insurance cover for such assets. Risks of natural disasters, pests and diseases attacking crops and livestock, thefts, continuous falling prices, and temptations from ‘wantoks’ requesting the use of assets, can all lead to a loss of assets very quickly.

Overall, it can be said that the physical and cultural environment is a more important contributing factor as to how financial assets are acquired, managed, and utilised in enhancing farmers’ livelihoods, than any achievements or losses with cocoa production.

10.5.4.2 Cultural Financial Security

One of the financial securities apart from the non-liquid assets discussed above are the people or ‘wantoks’ (relatives in Pidgin). Tolai and Wampar farmers connect to their culture continuously, in particular via the practice of the ‘wantok system’. The ‘wantok system’ is seen as a form of non-liquid asset as the rationale of the system is based on sharing and caring for others. For example; when a person is sick and needs medical attention, the family members would contribute to meeting their medical expenses. Likewise for a funeral, compensation, bride-price payments, age care, and so on. All members of the community have a cultural obligation to assist others who may be in need financially and/or physically and the obligation is reciprocated. This may sound obscure to western society where individualism is prevalent, but such a culture in PNG and the study sites creates an environment of financial security to some extent as community members feel they are not alone when financial obligations arise, knowing that the community or ‘wantoks’ will assist. Accordingly a philosophy of collectivism exists to everyone’s benefit. The trade-off is that wantok is prioritised above other matters, and accordingly takes precedence over things associated with agricultural production, including cocoa.
This does not suggest that all community members are totally dependent on others for financial needs. They secure financial assets themselves to meet their basic needs such as food, clothing, house, children’s school fees, health, church contributions, and many other livelihoods supporting activities. However, in the event they experience a shortfall, they may seek help from wantoks or relatives. Moreover, such culture has its own consequences as well, especially in this present era (21st century) with the increase in population and the rising cost of living that has been affecting households and the communities. The ‘wantok system’ culture of depending too much on others for both financial and physical needs creates hardship for families with more children and less resources. This is seen to be a potential contributing factor to the increase of poverty in the study areas.

10.5.4.3 Non-Saving Culture

Saving basically is about choosing between current and future consumption (Ashraf, Gons, Karlan, & Yin, 2003). Therefore, saving is critical to rural smallholder farmers and their households to meet their consumption needs during unfavourable trends (low prices for goods, unfavourable policies and so on) and shocks (pests, diseases, drought and so on) where basic government services are often lacking. The farmers of Wampar and Tolai do not have a saving culture due to the high cost of materials and services. It is, however, apparent that there are some Tolai who store their tambu (traditional shell money) for bride price, buying of land, and/or other major expenses. Otherwise, it is often arduous for many farmers to make long term savings in larger households, as they consume more and have lower average income per household per annum which makes it difficult to save.

Secondly, it was revealed in this study (see Box 7:3) that households contribute more to customary obligations such as bride price, funeral, and death feast expenses of relatives from savings than other potential expenses. Thirdly, it is obvious that farmers in the study sites are subsistence to semi-subsistence farmers and do not treat farming as a business to make a profit and save. Rather they see farming as just a part of a way of life to survive.

Non-saving behaviour of the farmers in the study areas has immediate implications for how they might need to deal with emergencies and unforeseeable events such as natural disasters (i.e. cocoa pod borer infestation). But of equal relevance to this study is that by not having a practice of saving, farmers are also unlikely to be able to invest in non-essential activities such as farming
improvements. Rather, cash which is available is allocated into maintaining basic household needs, or paying for children’s education, for example.

10.5.4.4 **Rural Credit Facilities**

The financial institutions such as commercial banks (BSP, ANZ, and Westpac for instance) are available to farmers, but their lending policies are more targeted towards commercial businesses. With high interest costs, loans are not feasible for a simple semi-subsistence farmer. There are Micro-finances and the Rural Development Bank (RDB), a government bank whose role is to fund agricultural projects, but for some reason, most farmers have difficulties in obtaining loans from them as well (see Chapter 8). For whatever the purpose, these Banks are unable to cater for the disadvantage farmers. It can be seen as a policy issue and political matter where a regulatory body should intervene to address such financial setbacks affecting farmers.

On the other hand, what seems to be working well is the credit provided by Agribusiness companies (suppliers, processors and traders), especially NGIP Agmark Ltd and Niugini Table Birds (NGTB). Agmark Ltd in Kokopo (ENBP) has arrangements with their cocoa farmers where the company provides the inputs such as cocoa seedlings, fertilizers, insect and weedicide, knapsack sprays, pruning tools, transportation, and extension services (see Section 9.2.4). The costs of the inputs are remitted when cocoa is sold to them. This arrangement works out well and it is a kind of cost-sharing approach. While it might appear to be a risky way of investing in smallholder cocoa farmers, the practice creates good relationships and trust is created. In recent cocoa projects, the World Bank and the PNG Government have been providing inputs for cocoa farmers under similar arrangements through The PNG Cocoa Board (PNGCB) (see Section 9.3.1). Thus, such arrangements as cost sharing for providing financial assistance are seen as viable and a sustainable way for providing credit to farmers where all inputs and advice required are provided to achieve the desired outcome.

10.5.5 **Physical Assets**

The type and availability of physical assets play an important role in influencing people’s perspectives on livelihood as well as their approach to cocoa production.
10.5.5.1 Infrastructure and Services

The physical assets consist of the basic infrastructure, materials, and goods required to enhance livelihoods. Across all the study sites rural people do not have access to running tap water, proper sanitation or electricity (although a few houses along the main highway or roads do). Amongst many other physical asset constraints, road repairs are needed, many schools have no textbooks or desks, and overcrowded health centres with few doctors and limited medical supplies are common place. The obvious change noticed in all study sites was the access to and use of mobile phone (communication) services provided by a private company called Digicel (PNG), a company with headquarters in Jamaica.

Improvements in road infrastructure are occurring. There is a new Trans-New Britain Highway under construction that will link East New Britain (ENB) and West New Britain Province (WNBP) that will run past Vudal and Burit villages. Such a major road network would make a large contribution to the oil palm industry to extend from WNBP to ENBP and that is anticipated to provide employment, revenue and the basic infrastructural services to surrounding communities where they are currently lacking. However, while this will provide community benefits overall, it will not likely positively influence cocoa production.

Lack of government services such as water supply, electricity, sanitation, poor road maintenance (Wampup and Gabsongkeg village), and lack of basic medical supplies in health centres affects people’s living standards. Such situations have implications for human health issues in the community. Despite the odds, people have the spirit of self-reliance where they share their resources and always find means to support themselves rather than depending on the government. However, if government services were adequately provided to such communities it would boost the desire of the people to improve their way of life. One of the classic examples is the accessibility of mobile phone reception provided by communication companies, especially Digicel PNG, who provide a mobile phone network service that reaches out to most rural and remote areas and has influenced many lives in those areas. This highlights that where investment can occur, whether it be private or otherwise, changes occur.

Improving agricultural production and development is dependent in part on good rural infrastructure. Government services such as roads, electricity, water supply, communication, health centres, and schools are important to enhance rural farmers’ livelihood. However, the study indicated that many infrastructure and services described above are not adequately
provided by the government and consequently can be seen to be a contributing factor to farmers operating below their potential in terms of agricultural production, including cocoa.

### 10.5.5.2 Markets

Production, processing and marketing are three important pillars of the agricultural economy. Cocoa has a steady market with buyers of both wet and dry beans, and most smallholder cocoa farmers are able to sell their produce except the farmers from the Wampup village of the Morobe Province who do not have cocoa buyers within their village. Nor do they have cocoa fermentaries so most of the cocoa is sold as wet beans that lose weight as they travel to other nearby market places. Some Wampup farmers expressed concerns about the difficulties in obtaining a cocoa fermentary and buying licenses from the Cocoa Board of PNG (CBPNG) and were therefore discouraged from increasing their cocoa production. This was also a concern of a few cocoa farmers in Gabsongkeg and Burit villages. Furthermore, low cocoa price is another ongoing problem that discourages farmers from focusing on cocoa.

Growing food crops and marketing is one of the main livelihood activities of all the households. Adequate marketing infrastructure such as roads, transportation, wholesale and retail markets, storage facilities, and processing facilities (fermentaries in the case of cocoa) are essential for cost-effective marketing and to minimise post-harvest losses. However, the marketing and storage facilities of fresh produce were a major concern of all the farmers. Farmers experienced crop losses and were discouraged to produce perishable crops in a large quantity. There are no proper fresh food market chains to give farmers choices in selling their products to better markets at higher prices. Farmers are able to produce more and earn more if these infrastructures and/or facilities are provided, and with proper regulated prices. In the absence of such assets, however, there is little incentive to change.

### 10.6 LIVELIHOOD PERSPECTIVES AS INFLUENCED BY CULTURE

Livelihood perspectives amongst Tolai and Wampar farmers is also influenced by culture (see Section 7.5). Culture is a complex phenomenon which includes knowledge, belief, art, morals, law, customs, way of life, and other elements acquired by people as members within a particular society (Ray, 2003). The culture of Papua New Guinea generally is complex, with more than 800 different languages and cultural groups. Like all other cultural groups, the Tolai and the Wampar people have their own unique customs, traditions, and beliefs that are different from other
regions. The ownership of traditional knowledge among the Tolai people is highly regulated, and the ways of acquiring it are clearly defined. Traditional knowledge might include traditional medicinal healings, dances, songs, or might be expressed in the arts. The Tolai and Wampar people may have some differences in their cultures, but the principles of their social networks are quite similar. Social factors such as relationships, societal networks, associations, trust, reciprocity and exchanges, and belongingness are important aspects to draw on when pursuing different livelihood activities.

Factors associated with culture are deeply rooted in the lore of the people, governing their traditional knowledge system with wide applications to their livelihood pursuits. The cultural factors and practices identified in this study that may have implications for farmers’ livelihood and cocoa production are summarised in Table 10.1. These implications have both positive and negative impacts on the farmers’ livelihood. Extension and research agents should be mindful of such factors in order to make interventions toward improved livelihoods.

**Table 10.1 Cultural factors and its implication on farmers’ livelihood and production**

<table>
<thead>
<tr>
<th>Cultural factors and practices</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td><em>Wantok</em> (system) (collectivism)</td>
<td>Sharing resources, care and security, belongingness</td>
</tr>
<tr>
<td><em>Puripuri</em> (witchcraft)</td>
<td>Sharing resources, belongingness</td>
</tr>
<tr>
<td>Land tenure</td>
<td>Unique tradition maintained</td>
</tr>
<tr>
<td>Polychronic</td>
<td>Flexible and adaptable to anything at any circumstances</td>
</tr>
<tr>
<td>Customs and traditional obligations</td>
<td>Identity, cultural recognition, belongingness, power</td>
</tr>
<tr>
<td>Traditional farming practices</td>
<td>Sustainable, adverse to risk, survival</td>
</tr>
</tbody>
</table>

**10.6.1 The ‘Wantok system’ (collectivism)**

As briefly alluded to above, one of the country’s (PNG) fundamental and significant cultures is the ‘wantok system’, a term (in pidgin) that refers to anyone who speaks the same language,
comes from the same area, and has common social associations or ethnic background. **Section 7.5.2** presents details of the ‘wantok system’. As discussed above, through the ‘wantok system’ one is expected to be accommodated, fed, and taken care of by one’s extended family as well as having a general sense of inclusion and belonging, and access to money. Such reward in return is reciprocated. It is regarded as a form of social security at a society level and is widely accepted. Therefore, the ‘wantok system’ has important values and meanings that bind and strengthen the Tolai and Wampar people and their traditions, and so cultural resources are rich in both societies.

The Tolai people are used to group work and associations while some Wampar people generally are more self-centred. The importance of the ‘wantok system’ to farmers’ livelihood is that people pool their scarce resources to help each other in sustaining their livelihoods. Therefore, the ‘wantok system’ still plays a significant role in shaping the farmer’s way of life in the context of sharing resources (labour, money, materials, love and care), providing a sense of security, wealth, and responsibilities and, in turn, enhancing their livelihood.

There are also some production related implications of the wantok system if people become too dependent on others with less reciprocity. In some instances farmers might put less effort into cocoa production and other income generating activities if they know that their ‘wantoks’ will provide when the need arises. Additionally, the application of the ‘wantok system’ is not conducive in the context of ‘modernisation’ as it is arguably a contributing factor to nepotism and corruption in all organisations, management, and political levels in the country.

**10.6.2 ‘Puripuri’ (witchcraft) With Essences of the ‘We Factor’**

The detail of this subject is covered in **Section 7.5.3** but it is being re-visited here in the context of implications for change in cocoa production and livelihood activities, since the study revealed that Tolai people apparently believe in witchcraft referred to as ‘puripuri’ spells.

Most Tolai people fear that evil spirits may be spilled on them through ‘puripuri’ by other clans if they acquire wealth, or venture into businesses, or undertake any other means of elevating to a higher standard or status than the rest of society. This fear keeps them on a standard ‘level’, where they choose to live on an equal social status with the rest of the community, choosing progress or advancement together rather than excelling individually, thus safeguarding themselves from any consequences of ‘puripuri’. The fear of ‘puripuri’ can also be an external
factor along with the ‘wantok system’ to encourage farmers to work together in groups and progress together as a community, previously referred to as the ‘we factor’ or ‘collectivism’. ‘We factor’ culture emphasizes relationships among people to a greater degree, it stresses interdependent activities and suppresses individual aims for the group’s welfare.

Although the ‘collectivism’ or ‘we culture’ is notable, the belief of ‘puripuri’ contributes to the suppression of innovative and venturesome farmers who wish to increase cocoa production or advance into other enterprises to bring more wealth and development into the community in order to improve the quality of life. In this sense, culture (puripuri) and increased productivity are on a conflicting course.

10.6.3 Land Tenure

Land tenure has a substantial impact on livelihood perspective. Land is a paramount part of a farmer’s life. Villagers have access to land to farm their crops and animals, but may not necessarily own the land. Land ownership is tied to the land tenure system in each society. Accordingly, land tenure is a vital factor that affects productivity of cocoa and other key investment by farmers. The extent of this importance can perhaps be best understood by the examples of the matrilineal land tenure system practised by the Tolai people, and communal or family owned lands as in the case of Wampup people.

As discussed previously, the Tolai community is a matrilineal society so women inherit the land and make decisions over it. Given such circumstances men are reluctant to invest or develop the inherited or customary land as they are aware that should they become deceased or encounter land disputes, their sisters will have rights over the land and not their children (see Section 7.6). The findings suggest that most male farmers from the Tolai have deviated to short-term land use strategies, rather than long-term investments such as expansion of cocoa trees blocks, replanting, or application of improved cocoa management techniques. The matrilineal land tenure system was found to be the main factor discouraging Tolai farmers from a full commitment to cocoa unless the land was purchased and owned by men.

The Wampar people practice patrilineality or agnatic kinship; however few family members of the clan own the land (communal land) (see Box 7:2). Consequently most farmers are merely custodians of the land and do not have legitimate rights over intense land use meaning they are unlikely to want, or even feel the right, to make wholesale changes to land use.
Despite the different land tenure lineage practiced by the Tolai and Wampar farmers, the effect of the land tenure system and ownership has similar impacts on both Tolai and Wampar farmers, where they are discouraged to commit to long-term investment in the land as they feel they do not have legitimate ownership. It is indisputable that the land customary tenure system is a contributing factor that affects farmers’ decision-making in the utilisation of assets and choice of activities that would have direct benefit to them. They merely focus on short-term strategies of farming, and are averse to investing time and resources in long-term strategies such as cocoa. This is possibly a fundamental reason why farmers treat cocoa as an ATM (Automatic Teller Machine), a source for instant cash rather than a long term investment opportunity. The result of this is that long term thinking about cocoa production is less likely (as alluded by Curry et al. (2007a)), suggesting that insecurity of land tenure can contribute to less production of cocoa and other enterprises.

10.6.4 Polychronic

Monochronic cultures tend to work and respond to time, while polychronic culture takes a more leisurely view of time (Hall, 1983). S. Cohen, Karmarck, and Mermelstein (1983) claimed that collectivist (‘we factor’) approaches are associated with polychronic cultures while individualist approaches are associated with a monochronic culture. The polychronic theory corresponds with the findings of this study as both Tolai and Wampar people practice the ‘wantok system’ with the essence of collectivism that defines their personality toward polychronic oriented use of time as explained in Section 7.5.3

Time is valued. It is highly important in many societies in the world. However, the Tolai and Wampar people value it differently from how a capitalist society might value it. Time is not an issue to the people as time is adjusted to suit their needs. Time seems to be always available, one is never too busy, and it is not necessary to finish one activity before starting another. Tasks are not completed as most activities are delayed. For example, cocoa pods ready for harvesting are not attended to when there is a death in the village as the farmer’s presence and participation in the funeral is more important. Normal daily activities can cease for a week or so. Both Tolai and Wampar farmers are more flexible about time; they have no problem integrating farming activities with socio-cultural and emotional tasks. Maintaining relationships and socialising are more important to them than accomplishing tasks. The advantage of polychronic behaviour is that it is flexible and adaptable to any circumstances. However, given the
production environment with scarce resources such as labour, infrastructure, and finance, the culture of switching or spreading their focus among many things may not be conducive to completing a task on time. Ultimately productivity is impacted.

### 10.6.5 Customs and Traditional Obligation

Sir Michael Somare, a former Prime Minister of Papua New Guinea once said;

> "Upholding our culture and beliefs is about our roots, our identity as true Papua New Guineans, from a traditional society that was handed down by our forefathers. Our village lifestyle must never be forgotten as we move into the new millennium. Our cultures and traditions must go side by side with the education we have gained so that we can unite them."

(The National, 2000)

Papua New Guinea is a country with diverse cultures which have encompassed various traditions and customs over generations. Such traditions and customs vary and are unique throughout the country. However the effects and implications of modernisation have created some tensions in the livelihood of the people (see Section 7.5 and Appendix 8.2). Customs and traditions are robust and all lines of people (educated and uneducated) in the community part take in such customs such as contributing to bride price payments, feasts following deaths, exchanges, ritual ceremonies, and thanksgiving in church activities. It was apparent that most farmers spent ample time in church work based on their belief that dedication to church activities means blessings from God (see details in Appendix 8.2).

Farmers work hard through various livelihood activities and what they earn is then committed into customary and traditional obligations rather than investing back into farms or other enterprises that would generate additional money. Maintaining their status and being recognised in the community is important to their lives, as they do not want to bring shame to themselves and their family (see Appendix 8.2). They do not have a saving culture as money is invested into customary obligations and not to farming or income generating activities (see Section 10.5.4.3). Furthermore, with the growing population and the intrusion of modernisation, the increased cost of goods and services has affected many families, creating a pathway to poverty. Although customs and traditions are important to the societies, the reality of modern changes is imminent and the way farmers view the world may need to change. That is where agricultural extension plays a pivotal role by developing awareness packages on how to accommodate modern changes and at the same time continue to embrace some of the traditions.
10.6.6 Traditional Farming Practices

Farming is a dominant livelihood activity of the Tolai and Wampar people (see Section 8.3.1). These societies are predominantly a rural based economy, dominated by subsistence agriculture and informal activities. Consequently survival is a fundamental purpose for farming. Culturally farming is a way of life where farmers acquired various traditional methods and techniques of farming that have been passed down through generations. Agriculture has always functioned within cultural bounds and society’s expectations. Farmers are wary of vulnerability and risks, so have engaged in multiple farming and non-farming activities in order to provide sustenance for the family. Their style of managing their farm is unique, as they have been surviving on their own strategies for decades with little direct input from the government or its agencies. However, in recent times, there has been a transition from subsistence farming to market-oriented production in agriculture.

Innovative technologies and methods of farming have been introduced over recent decades and yet adoption is poor despite the importance of the technologies and expected increases in productivity (see Section 9.7.6). In a society where the default position is survival, it is often challenging for the agricultural research and extension workers to bring about changes, especially in the concept of adopting new technologies in order to improve efficiency or productivity. It is apparent that extension and research workers really need to understand the farmers’ way of life before any interventions.

10.7 LIVELIHOOD DIVERSIFICATION AND ITS IMPACT ON COCOA PRODUCTION

According to this study (see Section 8.3), livelihood diversification is described as a way by which farmers and households undertake a range of activities for survival, recognition, raising income, and developing adversity to risk in order to achieve their livelihood goals. In fact most of these activities are sub-conscious as they don’t really think about them, since they are embedded in their culture and who they are. This section classifies the livelihood strategies of farming and non/off farming and discusses the context and its importance to cocoa production.

10.7.1 Farming as a Mainstay of Livelihood

To most PNG farmers, farming is life. Farmers’ lives revolve around their land and farming (see Section 8.3.1). They depend on their land to farm various food, cash crops and livestock, and use it for hunting, and collecting bush materials for building houses and handcrafts. Food crops
provide food for the household and the surplus is usually sold at local markets to earn income. Some food crops such as peanut, taro, watermelon, and some varieties of bananas are grown purposely for the market, however, the leftovers not sold are consumed. Most cash crops such as cocoa, coconut, and betel nut are sold seasonally, but there are random harvests of these crops from time to time.

Farming not only provides food and income for the farmers, but it is rooted in their cultural system. Farmers of Tolai and Wampar grow certain crops such as banana and taro for cultural ceremonies as well (for example; bride price, feasts for the dead, exchanges), and value such crops as of higher importance than cocoa. Both Tolai and Wampar people consider pigs as the most important animals culturally as they are used extensively in many forms of exchange, bride price payments, feasting, and as symbols of social status and rank. Pigs are used as gifts to establish or maintain social relations and as payments to resolve social disputes or strengthen relationships between individuals, families, and clans. Apart from their value in socio-cultural obligations, pigs are highly priced (K300 – K1500 depending on size) and can be a good source of income.

Farming is associated with daily survival (food and health), cash earnings, cultural festivities and status, as well as with assets for future use. This study recognises and appreciates the western ideas of bringing in changes to a community to improve its living standard, such as new agricultural technology and management skills. However, through their current connection to their land and cultural values, PNG farmers need to be carefully integrated when it comes to fostering change to improve productivity. In support of Vanclay’s (2004) set of farming principles that ‘farming is a socio-cultural practice’, RD&E within PNG should acknowledge and embrace farmers’ current approaches rather than taking farming as just a technical activity to increase production. As this study reveals, farmers value their current crop and animal systems as they have multiple uses in terms of food, income, and cultural significance. Because what they currently produce meets their needs, less attention is placed on introduced farming ideas and technologies. While there are upcoming ‘modern’ farmers, mostly educated or retirees who wish to pursue farming as a business, most are constrained by limitations surrounding land, funding, markets, and government services and support.
10.7.2 Livelihood is Not Just Farming

Household economies, increasing population, and cultural pressure has also caused the Tolai and Wampar households to participate in off/non-farming activities in order to obtain additional income (see Section 8.3.2 and Appendix 8.2). Participation in these activities plays an important role in increasing household income, and strengthening the capacity to meet their needs.

Attitude to risk is a notable driver for non-farming/off-farm engagement. It was apparent that the experience of the incursion of cocoa pod borer (CPB) (see Section 8.4.) and its impact on the cocoa farmers of East New Britain Province (ENBP) (including Vudal and Burit villages) in 2006 changed farmers’ perspectives of how such adverse events can affect their livelihood. The farmers of Wampup and Gabsongkeg experienced the same when palm weevils destroyed their betel nut trees in 2002 (see Box 8:3). Such experiences strengthened the farmers’ choices of diversifying into other non/off-farming strategies. Farmers equally value their cultural practices and obligations that define their status in the community. They find a balance from work by having leisure time for relaxation and to embrace their relationships with wantoks (relatives) (See Appendix 8.2). Such multiple activities demonstrate that farmers seek to make a reasonable income for a reasonable amount of activities with less risks for their survival whilst still embracing their culture, customs and traditions. This is their way of life and it provides for their livelihood.

10.7.3 Causes and Effects of Diversifying Livelihood Activities on Cocoa Production

As noted above, most farmers and households of the Tolai and Wampar have diverse livelihood activities. According to Chambers and Conway (1992), Carney (1998), Carney et al. (1999), DFID (1999) and Ellis (2000a), a diverse portfolio of activities contributes to the sustainability of a rural livelihood because it improves its long-term resilience in the face of adverse trends or sudden shocks. They claim that diversified livelihood activities are affected by seasonality, risk, labour markets, credit markets, asset strategies, and coping strategies. The findings of this study contrast with these views in that it was apparent that livelihood diversification was caused by land shortage, land tenure, minimising risk, cultural factors, farming system practised, opportunities, comparative advantage or farmers’ convenience.

Many of the factors causing diversified livelihood activities were discussed in Section 10.4 and 10.5 and various activities farmers and households engaged in were described in Chapter 7, 8 and 9. These include, for example, farming (including cocoa), church activities, employed jobs,
customary obligations, trade stores, buses for passengers (PMV), sawmilling, buying cocoa, hunting, leisure time, house chores, attending to meeting/disputes and parenting. Although farmers have a single livelihood, it is apparent that farmers and households are diversified into multiple activities at any one time and not merely on cocoa production. Consequently diversified activities in livelihood can be seen to be a contributory factor to current levels of cocoa production. Figure 10.2 summarises the cause and effects of diversified livelihood activities that impact on cocoa production.

![Figure 10.2 Illustration of cause and effects of various activities in livelihood and its impact on cocoa production.](image)

The findings from this study have identified several new factors in addition to the claims by Chambers and Conway (1992), Carney (1998), Carney et al. (1999), DFID (1999), and Ellis (2000a) about the major causes of diversified livelihood activities. Not all causes of diversified livelihood activities are uniform. Past studies (Ellis 2000a and others) identify key fundamental causes of diversified livelihood activities (seasonality, risk, labour markets, credit markets, asset strategies, and coping strategies), however, they vary depending on cultural, economic, political, physical, and natural settings of the particular society or community.

The causes of livelihood diversification illustrated in Figure 10.2 are reflective of a thin distribution of time, resources, and attention to a range of activities, rather than focusing merely on one particular activity. When cocoa is brought into the arena, less effort is available to be committed to cocoa production despite its importance to the farmer due to other demanding priorities. It is, therefore, important for extension agents, researchers, and policy makers to understand the dynamics of farmers’ settings and their livelihood strategies and work on incremental changes to improve what is already there and accepted by farmers.
10.8 FARMERS LIVELIHOOD OUTCOMES AND VULNERABILITY

What farmers seek as their livelihood outcomes as identified from this study varies slightly from village to village. However, overall the main desires of farmers were that they wish to:

i. have adequate food for the family,
ii. see their children getting a good education,
iii. build a good house (modern),
iv. maintain culture and traditions, and
v. earn enough income to meet and improve some of these desired goals.

The capacity of farmers to achieve these desires is influenced by the availability of assets they can access and utilise, the support they receive from service providers and enabling agencies, and the extent to which they are able to deal with vulnerability, although much of such support is often a challenge. Despite such circumstances farmers continue to strive.

As discussed earlier the rationale behind the farmers’ livelihood activities is ‘survival’. Their primary goal is survival through farming, and other desired farming associated outcomes are secondary. They interconnect with the culture and traditions and what they acquire in terms of money, goods and services is invested into their cultural obligations to maintain their status and prestige in the community. Although they might wish to build a decent modern house, for their children to great schools and so on, their actual actions and mindsets are focused on survival and cultural commitments and not long-term strategies. It is apparent that the household’s behaviour is very much associated with their culture and their environment. If changes need to happen then one has to understand the household environment and work towards bridging the modern view of how they see the world.

10.9 EMERGING INSIGHTS: LINKING STUDY FINDINGS TO THEORIES AND MODELS

The decision theories reviewed in Chapter 2 were largely based on advanced qualitative empirical studies. This study is not about how and why decisions are made so the relevant models have not been evaluated as such; however, a consideration of the findings of this research against these theories is useful. Of the six (6) decision theories and models described in Chapter 2, that is, elements of planned behaviour theory, motivation (need) and choice theory (MCT), personal construct theory (PCT), and diffusion of innovation models (DOI), each sheds some light on how the Tolai and Wampar households prioritise activities within their livelihood
perspectives. As well as that, the PCT and DOI model highlights how the extension and research agents view the farmers and the rationale behind their approach to farmers.

10.9.1 Theory of Planned Behaviour (TPB)

This theory assumes that a person’s behaviour is affected by variations in the person’s attitudes, social pressures (subjective norms) and perceived behavioural control (Ajzen, 1991, 2002a). The TPB was seen to be practised by farmers in both study areas, as their behaviour was not governed only by their attitude, but also by social and cultural pressures as well as their sense of control over what they could do. For example, farmers considered certain factors before deciding to engage or not in certain livelihood activities (behaviour-intent factor). Factors that farmers considered for such behaviour were discussed in Section 10.4 to 10.7. Farmers have experienced vulnerable circumstances, such as cocoa pod borer and betel nut weevil infestation on their cocoa and betel nut trees respectively that destroyed their main cash crops, but such experiences helped them to venture into other income generating activities. This is seen to be an application of TPB where the farmers’ intentions also avoid the unforeseen circumstances that limit their control; therefore, it helps predict future behaviour (diversify into other livelihood activities).

Furthermore, the subjective norms reflect an individual’s perceived social pressure that may emerge in the form of her/his beliefs about the normative expectations of others and motivation to comply with these expectations (Ajzen, 2002a, p. 1). The behaviour of the farmers in both study areas feature this theory. Because of their traditional culture farmers are obliged to participate in all customary obligations, otherwise they would be rejected in their community. Therefore, cultural factors such as the wantok system, puripuri, status and belonging, contributions to and taking part in customs are seen to be of paramount importance.

10.9.2 Personal Construct Theory (PCT)

The concept of Kelly’s (1955, p. 46) Personal Construct Theory (PCT) is that “a person’s processes are psychologically channelised by the ways in which he anticipates events”. This implies that a person is constantly striving to develop his view towards himself and his environment as he learns new things. Therefore, PCT suggests that the Tolai and Wampar farmers develop personal constructs on how they see their environment and how it works for them. Farmers then use these constructs to make sense of their observations and experiences. The environment that
the farmer lives in is the same as the rest of the community see it, but the way individuals experience it is different for each individual. Therefore, this makes sense in the way that some farmers in the study areas ventured into higher income activities, for example, sawmilling, buying wet cocoa beans, running buses, intensive chicken farming, and rearing cattle, as they saw the potential to increase their income. However others viewed it differently. They live in the same community, yet they view the world differently, which supports the PCT.

Interestingly, in Rogers (1962) diffusion of innovations theory and its associated adopter categorisations, the PCT is perceived in a different way, suggesting that farmers' adoption of innovations depends on their personal characteristics and their status in a social system. Accordingly Rogers classified farmers into different adoption categories from innovators (educated, high social status) to laggards (not educated, traditional). This reflected not only how farmers view the world through their experience (PCT) but also their status in the community. Both views are appreciated, but critics may debate further whether individuals have a different personal construct. Furthermore, the study indicates that extension and research workers' perceptions of farmers are different to how farmers actually view themselves (see Section 9.7.5) and that is inconsistent with the PCT.

10.9.3 Motivational (Need) and Choice Theory (MCT)

People make choices based on some kind of motivation or need that influences them. These motivational factors can be intrinsic or extrinsic according to Maslow (1970) in his *motivational need theory* (MNT). However, Glasser (1999) considered that people will always choose things based on their intrinsic motivations rather than extrinsic motivations in his *choice theory* (CT). This means that they are responsible for the decisions they make. Nevertheless, viewing the Glasser (1999) choice theory as part of the physiological or basic needs and partial safety needs of the Maslow (1970) hierarchical need theory, both theories can be merged as *motivational (need) and choice theory* (MCT). The aim of this section is not to test these two theories or to make critiques, but to highlight some of the findings and linkages to the proposition of these theories.

It was overt that farmers in all study sites behaved based on their intrinsic needs and other extrinsic factors such as community recognition, the wantok system, puripuri, land tenure implications and so on, which determined their choices in livelihood activities, and that is linked with MCT. For example, the farmers farm their land for food to survive (basic needs) and
surpluses are sold. They try to build their own houses, buy basic consumable (food) and non-consumable (clothing) items to sustain them. This was seen as intrinsic needs (both Choice and Need theory) as farmers were concerned for their basic needs and safety or security needs. Apart from normal food production, there were some farmers in the study sites who ventured into the next level of opportunities such as cattle farming (by Wampup farmers), out-growing chicken farming (by Gabsongkeg farmers), and cocoa buying and sawmill operation (by Vudal and Burit farmers). They were seen as leader farmers and gained respect and status in the community; thus they were notable in pursuing their social needs within Maslow’s hierarchy of needs. These farmers have self-esteem, the desire to elevate to the next level of life, and affirm relationships with the rest of the community for love and belongingness. Therefore, to some extent the behaviour of the farmers and the choices of livelihood activities undertaken at all study sites were notably linked to the intrinsic and extrinsic motivation and choice theory as described by Maslow (1970) and Glasser (1999).

10.9.4 Diffusion of Innovation Theory (DOI)

While adoption of innovations has received a lot of research interest, hindrance to innovation or barriers to adoption have always been an issue and perhaps the least understood area according to Selwyn (2003). In Papua New Guinea (PNG), lack of adoption of many agricultural technologies has been reported (Curry et al., 2007a; Daniel & Guest, 2011; Dekuku, Chambers, Pamphilon, Moat, & Komolong, 2005; Eric Omuru, 2001; Omuru & Lummani, 2001; E. C. Sitapai, 2012). However none of these studies critiqued the rationale behind Rogers (1962) diffusion of innovation theory (DOI) and the type of farmers the theory referred to.

10.9.4.1 Capitalist Based Approach

According to the literature (Rogers, 2003; Rogers & Shoemaker, 1971; Simmonds, 1985) Rogers’ diffusion of innovations (DOI) theory (see Chapter 2) is grounded in capitalist based farming with the intention of profit making as opposed to most farmers of Tolai and Wampar (and other parts of PNG) whom are subsistence based and rarely profit oriented.

There are flaws and misunderstanding of the essence of Rogers’s DOI theory and its application by the research, development and extension (RD&E) bodies in PNG and perhaps other developing countries. Research and extension agents in PNG have always approached the farmers with the intent of increasing productivity and efficiency, which is commendable,
however, most farmers are not profit driven and do not share the same view as the extension and research agents. Farming in PNG is a way of life and farming revolves around people’s livelihood. It means more than just income; it is merged into the highly socio-cultural system of society in PNG, including the study sites. It is obvious that there is a clear imbalance in the approach and rationale behind farming outcomes, between the research and extension agents and the farmers. Could it be that we (RD&E) have approached the farmers with the wrong intent?

This study strongly argues that it is imperative to isolate the profit making concept (increase productivity) and approach farmers based on what farmers consider important, and then work bottom up. A needs-based bottom up approach, based on a clear understanding of farmers’ assets, socio-cultural aspects, motivations, and behaviours may pave the way to balancing the perception of modern and traditional ways of farming and to develop new trends in how farmers should be approached. I believe researchers and extension agents are being deceived by their so-called innovative ideas, thinking that when implemented they will solve farmers’ problems. Rather researchers and extension agents have failed to understand that farmers view the world differently from them, thus leading to different perceptions of reality as Rhoades (1984) puts it neatly, “seeing-the-world-through different eyes” (in his article on understanding small-scale farmers in developing countries).

Therefore, Rogers’ DOI theoretical approach may be well suited to a few commercial farmers with profit driven motives, however, researchers and extension workers should have empathy with how farmers view the world and use a bottom up approach to facilitate the needs of the majority of rural subsistence farmers. Research and extension agents cannot bring in change to the farming communities alone; they need to understand the farmers and their environment, with support from good government investment and commitment.

10.9.5 A Flaw in Diffusion of Innovation Theory (DOI)

Rogers’ (2003) diffusion of innovation (DOI) theory is well known and fundamentally framed to improve productivity and economic development. Despite its importance, the process of DOI is still challenging in the context of research and development, in that understanding the dynamics of the decision making process by farmers in adopting (or rejecting) agricultural innovation (Léger & Swaminathan, 2007) is problematic. Not much research work has been carried out on
DOI to understand its dynamics and its complexity in the developing countries (Ohlmer et al., 1998) and this should be addressed.

It is apparent that Rogers’ (2003) DOI literature has some flaws as articulated further in Section 2.9. DOI theory does not account for human settings, capital assets, enabling agents, and/or socio-cultural factors, as considered necessary in the sustainable livelihood approach (ASLF) framework (see Figure 10.1). As revealed in this study (see Section 10.2), the ASLF is proposed as a means to understand the factors associated with the way farmers prioritise their activities within their livelihood perspective.

The ASLF offers a way of thinking about a pattern that helps unfold complexity and makes clear the range of factors that affect the farmers and their environment. Most of these factors are not accommodated within Rogers’ DOI theory. Hence, this study suggests that the factors (assets, enabling agents, culture, farmers’ motivation, vulnerability) captured in the ASLF in Figure10.1 represent the range of factors that Rogers’ DOI theory fails to appreciate as key drivers for influencing innovation adoption (or rejection) amongst PNG cocoa farmers.

10.10 CHAPTER SUMMARY

This chapter presented the fundamental contribution of this study in relation to existing literature on the farmers’ livelihood and factors affecting cocoa production in Morobe and East New Britain Province of Papua New Guinea (PNG). The findings revealed that farmers’ motives and needs, culture, availability and accessibility of assets, influence from enabling agents and service providers, and wariness of risks and opportunities were important contributing factors that affected farmers’ decision-making and choices in undertaking livelihood activities. This draws some similar pathways to the theoretically sustainable livelihood framework (SLF), hence, the study also identified different variables such as culture and farmers’ motivation (needs) which were not considered in the known theoretical SLF. Culture was seen to be paramount as peoples’ lives revolve within the norms of their culture and traditions.

The study also revealed that both the Tolai and Wampar farmers seem to encounter similar setbacks, not only affecting their cocoa production but also their standard of living and wellbeing. The factors identified included:

i. unequal availability and accessibility of assets (e.g., natural, social, human, financial, and physical),
ii. the strong influence of culture and traditions on their livelihood that becomes time consuming, costly, and a burden to individual households and the society,

iii. due to i) and ii) insecurity has deviated farmers from farming to other non/off farming activities to sustain their well being,

iv. delivery of research and extension services to farmers is poor with low or no uptake of agricultural technologies (including cocoa) and

v. government decentralisation reform is commendable, however, there is no clear pathway of directives, reporting, and coordination of programmes, thus affecting efficient and effective implementation of the government polices down to the grassroots level. There is no clear separation between the political and administrative functions as there is confusion in the roles they play, and so vital government services are typically poor.

The combination of these factors thus leads households to diversify into various livelihood activities for sustenance. As a consequence less attention is paid to cocoa production activity or improvement (resulting in low cocoa production). Therefore, it is apparent that there are multiple socio-cultural factors (as discussed above) that are contributing towards low cocoa production and farmers’ way of life.

In the past, interventions from RD&E were focused mainly on the technical aspects of improving productivity and efficiency, with little or no attention given to the farmers’ livelihood and culture. However, this study has identified key social-cultural issues emphasising that farmers’ lives revolve within the norms of their culture and traditions that are interconnected to their livelihoods. Therefore, in consideration of such circumstances, a refined conceptual framework for livelihood studies was developed in the PNG context specifically of Morobe and East New Britain Province, as a guide for further in-depth qualitative empirical investigations in livelihood and pathways to production. This framework, the Agricultural-based Sustainable Livelihood Framework or ASLF, has important implications for how approaches to RD&E can be re-thought. Additionally, some theoretical insights on existing literature across domains of decision making and innovation adoption, can be considered in terms of farmers’ livelihood and the factors affecting cocoa production in Papua New Guinea.
11 CHAPTER ELEVEN: CONCLUSIONS, CONTRIBUTIONS AND RECOMMENDATIONS

11.1 INTRODUCTION

This study examined the nature and form of the livelihood perspective, and its associated activities, of smallholder cocoa farmers in selected areas of Morobe and East New Britain Provinces of Papua New Guinea. The study focused on the factors that affected farmers’ decision making concerning livelihood choices, and considered the impact of interventions on farmers’ household economies and on their well-being. The study also established an understanding of researchers’ and extension workers’ views of livelihood and their perceptions of smallholder cocoa farmers.

Firstly, this chapter re-considers the original three research questions as stated in Chapter 1, namely:

i. What is the nature and extent of a livelihood system amongst smallholder cocoa farmers in the study areas?

ii. What are the factors influencing farmers’ decision-making about their choice of livelihood activities (including cocoa production)?

iii. What are the researchers’ and extension workers’ perceptions of the smallholder cocoa farmers and their understanding of cocoa issues?

In addressing each of these questions, this chapter justifies the implications of the findings, establishes the new concepts as contributions to existing knowledge, and further makes recommendations for policy and practices. The chapter finally wraps up with suggestions for future research.

11.2 SYNTHESIS OF RESEARCH FINDINGS AS RESPONSES TO RESEARCH QUESTIONS

The main research findings are chapter specific (Chapters 7, 8, and 9) and were discussed and conceptualised in Chapter 10. This section of this chapter will synthesise the research findings to answer the study’s three research questions as follows:
11.2.1 **Research Question 1: What is the nature and extent of the livelihood system of smallholder cocoa farmers in the study areas?**

In answering this question the nature and extent of a livelihood system of smallholder cocoa farmers has been identified and documented in Chapters 7, 8 and 9, before being conceptualised in Chapter 10 and illustrated within Figure 10.1, the Agricultural-Based Sustainable Livelihood Framework (ASFL). The ASFL is a modification of the previously published Sustainable Livelihood Approach (SLA) framework, so designed specifically for understanding features of poverty. The ASFL offers a way of thinking about livelihood that helps makes clear the range of factors that affect the farmers, the decisions they make and their everyday activities.

The human settings and the economy of the Tolai and the Wampar people are fundamental to their way of life, enabling them to undertake what they feel is important in their livelihood. For this reason it is important to understand the farmers’ background, physical features and organisation, and how these things affect a farmer’s choices about livelihood activities, including the relative priority for cocoa production. This is important information for any change or enabling agent to know, in order for developmental interventions influencing cocoa production to take place.

As revealed in the findings presented in Chapter 7, the human settings varied between the two provinces and within the study sites in terms of language, land tenure systems, culture and infrastructures. However, each province faced similar challenges in terms of a lack government support services and the poor state of infrastructure. Similarly, culture influences peoples’ mindsets and behaviour, through to the status of the village economy and social organisation. While farmers carry out multiple activities as part of their lifestyle, fulfilling their cultural and community obligations is fundamentally important, even at the expense of farming.

One of the main setbacks of both societies is land tenure issues that restrict them from venturing into long term investments, including cocoa development. Consequently most activity focuses on short term livelihood activities, which ultimately impacts on cocoa productivity.

The research findings provided the specific attributes that form part of the livelihood system and that is further explored in the next research question.
11.2.2 Research Question 2: What are the factors influencing the farmers’ decision-making about their choice of livelihood activities (including cocoa production)?

The ASFL framework identifies a range of factors influencing farmers’ decision-making about the choice of livelihood activity a farmer or household undertakes. The factors identified include:

i. the farmer’s motives and needs
ii. culture and related factors
iii. availability and accessibility of assets
iv. influence from enabling agents and service providers, and
v. vulnerability, risk and/or opportunities.

It was the relationship between these factors that was seen to influence farmers’ choices in assessing the relative importance of, and undertaking, certain livelihood activities (including cocoa production). The findings of this study suggest that farmers have a common goal towards livelihood as a means for survival and adapting to changes. In doing so, individual farmers and their families are able to consolidate their capacities, natural abilities, and information, with assets available to them, to generate a number of activities that empower them to survive and achieve their goals.

With this in mind, the factors influencing farmers in making livelihood decisions include the following.

11.2.2.1 Farmer’s Motivation and Need Factors

Smallholder cocoa farmers make certain choices based on their needs or motivation, consistent with the findings of Maslow (1970) and Glasser (1999). Thus, a farmer’s choice about engaging in a certain livelihood activity is triggered by personal motivational or need factors. It appears from this research that the behavior of farmers in all study sites was based primarily on their intrinsic needs, and, secondarily on some extrinsic factors such as community recognition, the ‘wantok system’, puripuri, land tenure implications, availability of markets, best selling price, desired goals or outcomes, and so on. As a farmer’s primary motivation is intrinsic, it is more influenced by culture and by community values than by any desire to be recognised as a ‘strong performing’ cocoa producer.
11.2.2 Cultural Factors

The study also revealed (see Chapter 7) that the Tolai and Wampar farmers’ engagement in various livelihood activities is influenced by their cultural practices, beliefs, and norms. Culture is a complex phenomenon where Tolai and Wampar farmers have their own customs, traditions, and beliefs that are different from other regions. Despite differences, the principles of their social networks are quite similar. Relationships, networks, associations, cooperation, trust, reciprocity and exchanges and belongingness are all common cultural elements between the two regions that influence livelihood activities. Specific cultural factors and practices identified in this study that appear to have implications on farmers’ livelihoods and cocoa production include the ‘wantok system’ (collectivism); puripuri (witchcraft); land tenure; polychronism; customary obligations; and traditional farming practices. Farmers invest most of their earnings into cultural obligations such as bride price, rituals, feasts, church, and so on, rather than farming or other long-term investments. Factors associated with culture are deeply rooted in the lore of the people which governs their traditional knowledge system and has wide applications to their livelihood pursuits. Culture is seen to be paramount, and is upheld in all study areas.

11.2.2.3 Livelihood Assets

The livelihood assets identified in this study were categorised into natural, social, financial, physical, human, and cultural assets (see Chapter 8). Livelihood assets are fundamental as a resource base for the community and its smallholder farmers. Farmers combine the assets in many different ways to generate positive livelihood outcomes. The scale of assets differs across all study sites based on availability, accessibility, desire of usage, and vulnerability. It was also apparent that constraints in assets such as land shortages, inadequate finance, cultural influences, and poor government infrastructural support and services were common in all study areas, thus affecting farmers in the manner they pursued their livelihood. Such limitations to asset availability no doubt affect farmers’ decision-making and choices about livelihood activities.

The availability and accessibility of the combination of these assets may have a great influence on the farmers on what livelihood activities to undertake, hence livelihood assets are necessary for farmers’ livelihood improvement.
11.2.2.4  **Enabling Agents and Service Providers**

Beyond the livelihood assets and strategies that farmers undertake, have control of, or access directly, they also depend on various service providers (government agents) to provide them with vital goods and services (electricity, roads, water, education) that they need for their livelihoods activities. Chapter 9 outlines some key challenges and issues that are a hindrance to the delivery of services to farmers and rural communities. Chapter 10 also summarises these challenges as they relate to the efforts of agencies involved in research, development and extension (RD&E), and basic service delivery.

Adequate support from service providers such as banks, as well as access to markets, cold storage, agricultural suppliers, good roads and transport, would have considerable influence on farmers considering whether to venture into more opportunities to improve and enhance their livelihood. Such support is not the reality, however, so ultimately agricultural production is impacted.

11.2.2.5  **Vulnerability, Risk and/or Opportunities**

When farmers engage in a range of livelihood activities, and are confronted with challenges largely beyond their control, this is the concept of vulnerability. The factors that lead to a vulnerability context have a direct impact on farmers’ assets and the options that are open to them in pursuit of beneficial livelihood outcomes. According to the study findings (Chapter 8), farmers were affected by both external and internal events such as shocks (for example pests and diseases), critical trends (including demographic, government policies, and technological trends), and seasonality or circumstantial circumstances (for instance prices or migration). One instance of vulnerability is the story of Cocoa Pod Borer (CPB) experienced by the Tolais (see Box 8.2) and another is the effect of the destruction of the betel nut trees of the Wampar people in 2002/3 (see Box 8.3).

The implication of such risks is that farmers tend to venture into other livelihood activities so they are not affected again, which is one of the triggering factors of livelihood diversification.

11.2.2.6  **Other Causes of Livelihood Diversification**

Other attributes identified during the study were associated with the above five factors, and they are believed to also contribute to the diversification of livelihood activities. As noted in
chapters 7, 8, and 9 and later described in Section 10.6, the following key fundamental causes of diversified livelihood activities were identified: seasonality, risk, labour markets, credit markets, asset strategies, and coping strategies (Ellis, 2000a and others). However, the impact of these factors varies depending on cultural, economic, political, physical, and natural settings of the particular society or community. Hence, according to this study, the causes of livelihood diversification are influenced by a number of factors such as land tenure issues, land scarcity, change, comparative advantages, opportunities, minimise risks and farming system. These factors cause the farmers to diversify to alternative activities in order to provide sustenance and maintain livelihoods. When farmers diversify into multiple activities, time, resources, and attention to a range of activities are thinly distributed rather than the focus being just on one particular activity. When cocoa is brought into this decision space, less effort is available to be committed to cocoa production despite its importance to the farmer.

The key factors influencing the farmers in decision-making in undertaking certain livelihood activities are articulated above, however, researchers and extension workers have their own perceptions of farmers’ livelihood and this leads to presenting the answers to the next research question below.

11.2.3 Research Question 3: What are the researchers’ and extension workers’ perceptions of the smallholder cocoa farmers and their understanding of cocoa issues?

The perception of researchers and extension workers from the Cocoa Coconut Institute (CCI), the Papua New Guinea Cocoa Board (PNGCB), NGIP Agmark Company, the National Agricultural Research Institute (NARI), and East New Britain and Morobe Provincial and District Department of Agriculture and Livestock (PDAL, DDAL) were identified and documented. These institutions are directly involved with the crop and cocoa farmers to some extent.

There were two common perceptions held by research and advisory workers of smallholder cocoa farmers and they also outlined a number of policy issues affecting the cocoa industry generally. Firstly the two perspectives are presented, followed by the issues affecting the cocoa industry.
11.2.3.1 Smallholder Farmers are Poor Adopters

It was generally considered by extension and research workers that smallholder cocoa farmers are poor adopters of cocoa related innovations (see Section 9.7.6). The common explanation for this situation was that most research and advisory workers believe farmers do not see cocoa production as a business pursuit. Rather they see smallholder farmers as only attending to cocoa when the need arises for cash; that is, cocoa is regarded as an automatic teller machine (ATM). The consequence of this is that minimal effort is made to improve their cocoa blocks through innovation or technology approaches.

This perception clearly indicates that research and extension agents have always approached the farmers with the intent of increasing productivity and efficiency (see Section 10.9.4.1). This is commendable, however, most farmers are not profit driven and do not share the same view as the extension and research agents. It is obvious that there is a clear imbalance between the smallholder cocoa farmer rationale for farming and the research and extension agent priorities. Is poor adoption an issue for the farmers or for research and change agents?

11.2.3.2 Lack of Understanding of Socio-cultural Aspects

This study proposed that much of the previous technical and socio-economic research on smallholder cocoa production was aimed toward increasing cocoa productivity, a largely capitalist focus. The findings of this study suggest, however, that a socio-cultural analysis toward understanding the farmers and their way and choice of life (see section 9.7.5) has an important role to play in improving farmer livelihoods. Over the years, the RD&E in agriculture has continued to focus on technical aspects of increasing yield, productivity and efficiency. This is a capitalist based approach that is considered imperative for commercial farming. Yet it is not necessary for the subsistence based farming where most farmers’ intention in farming is to survive rather than conduct business (see section 10.9.4). Unfortunately, RD&E ignores or focuses less attention on the farmers’ livelihood and understanding of what farming means to a farmer. It is clear that smallholder farmers see farming as a way of life which is different to the RD&E’s perspective. Therefore, farmers and RD&E often clash in terms of what is important and to whom.
11.2.3.3 **Issues Affecting Cocoa Production**

There are number of issues identified in this study that are presented in **chapter 9, Section 9.7**. What is mentioned here is the policy and/or managerial setbacks encountered by researchers and extension organisations to improve cocoa production and the overall livelihood of rural farmers.

- **Decentralisation of government.** Communication and reporting functions and powers were transferred from a National level to a District and then Local Level of Government. The intention was for services to reach the grassroots directly rather than through a ‘middleman’. However, there were two major setbacks. Firstly, funds identified for district use rarely reach the districts in time for implementation, or sometimes not at all. Secondly, the decentralisation process has created dysfunctional reporting and/or communication systems between all levels of government and the intended recipients.

- **Poor institutional collaboration.** Although the private and public research and extension institutions collaborate in respect to cocoa projects to some extent, there is no proper coordination between agencies carrying out the same programme, targeting the same farmer. This creates duplication in running extension services.

- **Inadequate manpower and support.** The provision of technical assistance is often hampered by a lack of resources. This includes a relatively low level of public investment in infrastructure such as staff housing, laboratories, and equipment.

**11.3 IMPLICATIONS OF THIS RESEARCH**

Overall, the study findings presented a comprehensive understanding of livelihood systems of smallholder cocoa farmers of Vudal, Burit, Wampup, and Gabsongkeg villages amongst the Tolai and Wampar people. This study provided a descriptive observation and analysis of the village settings, farmers’ experiences and their way of life, factors affecting cocoa production, the challenges of the research and extension workers, and their perspective of farmers’ livelihood (see **chapter 7**). The findings reinforce the claim that there are multiple factors that affect the farmer decision-making and their choices in undertaking various livelihood activities (including cocoa) for sustenance and survival. These multiple factors are found to be more associated with their traditions, customs, and beliefs that the farmers have embedded in their culture, that also intertwine with farming and other livelihood activities they undertake (see **chapter 8**). Inadequate support and non-delivery of essential Government services has been a hindrance to farmers’ well-being and development, including cocoa production (see **Section 9.7**).

The study further proposes that RD&E in agriculture is more focused on technical aspects of farming to improve production by setting targets of high productivity and efficiency as a
benchmark. RD&E tends to see farmers as non-business minded and less productive (low input/output). However the farmers’ perceive the situation differently. They are accustomed to subsistence farming for sustenance where surpluses are sold. It is clear that there is a clash between science (RD&E) and tradition (farmers) on the rationale for farming and development.

Complex systems need multi-disciplinary approaches to understand the livelihood systems completely in a holistic spectrum. There is an opportunity for RD&E to rethink and realign their approaches to farmers and have empathy with how farmers view the world, to embrace the farmers’ livelihood system, and to ultimately empower the farmers in a more practical way from the bottom up to improve their livelihoods. This study provides a benchmark on livelihood systems and the factors affecting farmer livelihoods and its relevance to cocoa production, which can further be empirically tested or researched quantitatively.

11.4 PRAGMATIC CONTRIBUTIONS OF THIS WORK

In PNG it is perhaps the first time that a livelihood concept has been used to understand smallholder cocoa production settings and cocoa farmers’ way of life. In doing so there are four (4) main pragmatic contributions of this thesis.

i. A cross-sectional descriptive analysis of the human settlement, social organisation, and economy of Wampup and Gabsongkeg villages of Morobe Province and Vudal and Burit villages of ENP as presented in Chapter 7.

ii. A cross-sectional descriptive analysis of the livelihood assets, livelihood strategies and identified constraints of the same villages as presented in Chapter 8 (see Section 8.3).

iii. A cross-sectional descriptive analysis of the enabling agents and service providers who influence cocoa production and the challenges affecting cocoa production as discussed in Chapter 9.

iv. From the analysis of A), B), and C), the factors affecting farmers’ livelihoods and cocoa production were identified and a new sustainable livelihood framework (ASLF) was developed (see Chapter 10)

Other pragmatic contributions of this thesis are:

i. An emerging flaw in Rogers’ diffusion of innovation (DOI) literature was established in this study. DOI theory does not account for human settings, capital assets, enabling agents, and/or socio-cultural factors, as is considered necessary in the sustainable livelihood approach (ASLF) framework (see Figure 10.1) from this study. The ASLF offers a way of
thinking about a pattern that helps unfold complexity and makes clear many factors that affect the farmers and their environment, and these factors of ASLF are not considered in Rogers DOI theory. Hence, this study suggests that the factors (assets, enabling agents, culture, farmers’ motivation, vulnerability) verified in the ASLF should be considered along with Rogers’ DOI theory to fully understand the process of how farmers make decisions in adopting (or rejecting) an innovation.

ii. In past interventions, RD&E organisations and agencies focused merely on the technical aspects of improving productivity and efficiency, with little or no attention to the farmers’ livelihood and culture (see section 9.7.5). However, this study has identified several key social-cultural issues emphasising that farmers lives revolve within the norms of their culture and traditions that are interconnected to their livelihoods. Therefore, in consideration of such circumstances, a refined conceptual framework for livelihood studies was developed in the PNG context specifically for Morobe and East New Britain Province, as a guide for further in-depth qualitative empirical investigations in livelihood and pathways to production.

iii. The study also incorporated two new elements into the livelihood framework: ‘farmer’s motivation’ and ‘culture & traditions’, both seemingly absent from the conventional livelihood framework (SLA) developed by emerging and past researchers (for example, described by; Chambers & Conway, 1992; DFID, 1999; Ellis, 1993; Krantz, 2001; Scoones, 1998, etc.).

iv. Many livelihood studies (for example, Chambers & Conway, 1992; Ellis, 1999; Hogger, 2004; Ireland et al., 2004 etc.) have been conducted, especially in the developing countries, towards developing an improved understanding of poverty and development to sustainably reduce or eradicate poverty and issues of food security. However, no known study has been undertaken using a livelihood concept to understand smallholder cocoa production settings, cocoa farmers’ way of life, or identifying the factors influencing the cocoa farmers’ in undertaking diverse livelihood activities in the study areas (Ohlmer et al., 1998). This study has aimed to answer some of this phenomena.
11.5 RECOMMENDATIONS

This study has identified a number of insights and potential changes that may help RD&E to understand the holistic view of farmers’ livelihoods and their needs in order to improve and support smallholder cocoa farmers’ livelihoods and cocoa production. The strategic approach suggested for the policy makers (Government Authorities) and RD&E organisations in particular CCI and PNGCB includes the following facets.

1. The Government’s decentralisation reforms are commendable, however, there are impediments that were highlighted in this study. In order to see tangible changes at the community level, these issues need to be addressed. Therefore, this study suggests that the policy makers should:

   (i) ensure coherence between National and Local Level Government, in particular the channel of directives and reporting

   (ii) provide adequate public investment in District Level infrastructures

   (iii) acquire and train more human resources

   (iv) define clear roles of the bureaucrats with less or no political interference, and

   (v) encourage RD&E to carry out bottom up planning that is concerned with local economic development and empowerment and creates a firm network with farmers rather than focusing merely on increasing productivity.

Therefore, the Government decentralisation reforms need to re-define, link the channel of communication from the National to District level, and make directives and reporting protocols practical and functional. Otherwise, the current situation will continue to be a major hindrance to the growth and development of the rural farmers and the communities.

2. Population increases and pressure on land use will continue to rise and farmers will seek various means apart from farming to survive. Therefore, it is imperative that RD&E agents, in particular the CCI and the CBPNG to:

   a. understand the dynamics of farmers’ environment, their livelihood strategies, and challenges, and to work on incremental changes to improve what is already there and accepted by farmers, in the context of their choice of livelihood activities, economic possibilities, and socio-cultural permissiveness in order to bring changes to farmers’ attitudes towards cocoa.

   b. empower farmers to be active players in agricultural projects and programmes by supporting farmers and their communities through training, facilitating or funding, identifying markets, lobbying Local and Provincial Government for support, and building trust, and
c. undertake further socio-economic studies to identify groups of innovative resource based farmers who are keen to progress cocoa farming as a business, thereby assisting production improvements and at the same time facilitate and advocate other smallholder cocoa farmers.

3. Farmers are not poor, they make adequate money from various sources However, they lack money management skills. Money earned from farming crops such as cocoa is invested in customary obligations and not back into farming. Therefore, RD&E agents and agencies should understand farmers’ livelihood system, their behaviour and culture, and use this information to identify training needs in order to formulate appropriate short and long-term strategies to improve their financial livelihoods by:
   a. conducting training on managing money and resources
   b. provide and facilitate credit facilities or funding to smallholder farmers
   c. explore market opportunities and improve infrastructure
   d. establish better networking and collaboration with farmers and other stakeholders, and
   c. provide regular visitations to the farmers, including monitoring and evaluating progress.

11.6 FINAL COMMENT
This study has identified that production of cocoa is only one of many priorities in the livelihood of a smallholder cocoa producer and usually not the most important. This, in itself, is an important revelation explaining, at least in part, why cocoa production levels remain below what research, development and extension (RD&E) organisations and agencies believe is potentially achievable. Cultural and traditional priorities of a smallholder cocoa farmer’s way of life demand time and resources that could perhaps otherwise be dedicated to improving cocoa production. For RD&E organisations to address this situation, they need first to acknowledge the cultural context of the farmer’s livelihood and then seek to identify ways of incorporating cocoa production into this culture. The necessary approach is likely to be a long one, built around an even greater understanding of livelihood across more PNG provinces and focused on accommodating cultural diversity. As a starting point the approach needs to ignore the principles of extension and innovation transfer in a western capitalist sense and invest in building the capacity of those already recognised as being influential within local communities.
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13 APPENDICES

13.1 APPENDIX 5.1: AGRICULTURAL EXTENSION AND DEVELOPMENT IN PAPUA NEW GUINEA

This appendix is a further elaboration of chapter 5 that presents Agricultural Extension and Development in PNG.

13.1.1 Introduction

General global extension practices were reviewed in Chapter 3, however, an understanding of the trends, opportunities, and challenges of agricultural extension in PNG is important in contextualising the contribution of the research within this thesis. In Papua New Guinea (PNG), complexity in the agricultural extension service has developed alongside various political, administrative and institutional reforms over the last fifty years (Sitapai, 2011). Agricultural extension was initially a National Government function in the 1950s and 1960s (R. F. McKillop, 1976; E. C. Sitapai, 2012). However, presently the extension service is a shared responsibility of the Government at all levels (National, Provincial and Local) as well as statutory commodity boards and Non-Government Organisations (NGO). Despite the institutional complexity of service providers, extension services are industry specific and supply-driven with a central focus on increasing production of cash crops.

13.1.2 History of Agricultural Extension Services

PNG had its independence in September 15, 1975. This section provides a synopsis of agricultural extension services in PNG before and after Independence.

13.1.2.1 Pre-Independence Period

The agricultural extension service in PNG is believed to have started in the 1930s with the introduction of plantation cash crops especially coconut, cocoa, and rubber (Dennis, 1981). Briefly after World War II an Australian colonised administration developed a policy for PNG to become an export-oriented economy and started rehabilitating the agriculture sector, especially focusing on perennial tree crops such as coffee, cocoa, coconut, rubber and tea. To facilitate such reforms the then Department of Agriculture Stock and Fisheries (DASF) established a number of agricultural experiment stations in the 1950s at strategic locations in the country (E.
C. Sitapai, 2012) including Laloki (Central Province), Kerevat (East New Britain), Labu (Morobe Province), Aiyura (Eastern Highlands Province) and Kuk (Western Highlands Province). Each experiment station established an improved stock of planting material and information for farming communities. The DASF also established extension centres in all regions associated with these stations, which also became venues for farmer training and information dissemination.

The main model of extension used was the Training and Visit (T&V) system. The T&V programs were tailored towards land settlement schemes; thus, identifying viable land for plantation crops (cocoa, coffee, coconut, oil palm, rubber and so on), developing improved planting materials and providing technical advice. Many agricultural projects in the two decades before Independence were delivered exclusively by this approach. T&V system also contributed to improvements in the beef industry (R. F. McKillop, 1976). The Extension Officers were trained at agricultural training colleges established by the DASF and were regarded as general agriculturalists with no specialisation. They visited farmers with prescribed guidelines for addressing their production constraints, thus with the aim of increasing production. An Agricultural Extension Officer position was a prominent post in the colonial public service system for many years and absorbed a number of officers under then the DASF (E. C. Sitapai, 2012). The next section presents the extension services after the independence period.

13.1.2.2 Post-Independence Period

After Papua New Guinea gained its Independence from Australia (September 1975), the operation of extension services in the post-independence period was largely influenced by two Government policy interventions: the decentralisation policy adopted shortly after Independence, and then, subsequently almost two decades later, the corporatisation policy of the 1990s (E. C. Sitapai, 2012). The following is an account of impact of these policies on agricultural extension to the present time.

13.1.2.3 The Decentralisation Policy

The Organic Law on Provincial Governments (OLPG) was passed in 1977 with the intervention of decentralisation policy (May 2009). The goal of decentralisation was to empower and enhance the provinces to have autonomy over their own development priorities and manage their own funds. Provincial Governments were established and the development functions and financial powers were transferred from the National Government to the Provincial Governments. In the
process the agricultural extension functions were then decentralised from a national to provincial function (E. C. Sitapai, 2012).

In 1995 the Government amended the OLPG Act in parliament, further decentralising Provincial Government to a Local Level Government system to give recognition to districts as the focus for local development planning and services delivery (May, 2004). Consequently, the responsibility for agricultural extension was further decentralised to the Local Level Governments (LLGs), thus, creating a vague reporting system from district to provincial and national level that still exists today. For example, at the district level, extension officers report to district managers for their activities, and receive no directives from the agricultural advisors at the provincial headquarters. This circumstance is made more complicated by the administration of district support improvement program (DSIP) grants that the National Government disburses to all districts in the country.

In addition to the communication and reporting complexity described above, Government extension programs at provincial and district level are also inadequately staffed and resourced. Despite an expansion of the procurement of provincial grants and increased rural sector funding over recent decades, staffing and resourcing has not improved. Such circumstances gave rise to the involvement of private sector organisations in providing vital extension and advisory services.

13.1.2.4 The Corporatisation of the Agricultural Sector

In 1990 the PNG Government adopted a corporatisation policy under which key commodity organisations for coffee, oil palm, cocoa and coconuts were created as separate statutory bodies (Sitapai, 2011). The purpose of the policy was to give the commodity industries the liberty to manage themselves and be made directly accountable to their clients and partners. The corporate institutions collaborated with the provinces, districts, and the local level in extension and development activities. Local agencies of these corporate institutions were self-funding through industry-imposed levies, but they also received annual subsidiary funding from the National Government. The provincial and district programme priorities were, and remain, often determined independently of national agencies. Such fragmented program planning, reporting and implementation continues to persist throughout contemporary extension services (E. C. Sitapai, 2012).
The corporatisation process also resulted in the transfer of the research functions for tree crops (coffee, oil palm, cocoa and coconuts), food crops and livestock from NDAL to agricultural statutory bodies (E. C. Sitapai, 2012). Fundamentally, the process allowed the agricultural research to remain as a national function under the National Agricultural Research Systems (NARS), while agricultural extension functions continued to be a function of all levels of Government, as well as private sector agencies. The growth of the Papua New Guinea National Agricultural Research Systems (PNGNARS) is worth highlighting here, because of its potential impact and influence on agricultural development. Accounts of four commodity groups of NARS and their technology packages that can impact farming communities through extension are provided in Table 13.1. The detail is provided only for the purposes of comparing cocoa investment with other major PNG industries.

Table 13.1.1 Commodity groups of NARS and their respective technology packages

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Technology package for farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coffee</strong></td>
<td>Coffee research and extension functions were taken over by Coffee Industry Corporation (CIC) in 1990 (E. C. Sitapai, 2012).</td>
</tr>
<tr>
<td></td>
<td>Since then CIC has produced improved coffee varieties (both Arabica and Robusta), agronomic and processing techniques, and extension models for disseminating proven technology packages.</td>
</tr>
<tr>
<td></td>
<td>CIC has developed improved processing techniques to up-skill farmers in producing high quality coffee beans to increase production and income (CIC, 2011).</td>
</tr>
<tr>
<td><strong>Cocoa and coconut</strong></td>
<td>Corporatisation of cocoa and coconut research and extension functions commenced in the late 1980s, but under different entities until 2004, when they were amalgamated under PNG Cocoa Coconut Institute Limited (CCIL).</td>
</tr>
<tr>
<td></td>
<td>CCIL has released many cocoa and coconut technologies to farmers. Fine hybrid cocoa clones were developed which can yield over 1,500 kg of cocoa beans per ha (Daniel et al., 2011).</td>
</tr>
<tr>
<td></td>
<td>With better adopted farm management practices (including cocoa pod borer control), farmers can achieve 50-75 percent increase in cocoa bean yield over 10 years (Papua New Guinea Cocoa and Coconut Institute, 2010).</td>
</tr>
<tr>
<td><strong>Oil palm</strong></td>
<td>Oil Palm Research Association (OPRA) took over oil palm research in 1984 and the extension component by Oil Palm Industry Corporation (OPIC) in 1991.</td>
</tr>
<tr>
<td></td>
<td>OPRA is an industry body supported by all estate companies, while OPIC is a statutory body.</td>
</tr>
<tr>
<td></td>
<td>There are many oil palm technologies released in PNG over the years. The oil palm industry currently enjoys the benefit of high yielding seed developed from 40 years of oil palm breeding in PNG.</td>
</tr>
<tr>
<td></td>
<td>At estate level, palms from this improved seed can produce 25 MT of fresh fruit bunches (FFB) per ha. Smallholders can only produce 8-10 MT of FFB per ha.</td>
</tr>
<tr>
<td></td>
<td>With support of extension, smallholders can increase their yields by 50% or more if they diligently applied fertilizer to their palms (E. C. Sitapai, 2012).</td>
</tr>
</tbody>
</table>
Research in food crops and livestock became the responsibility of the National Agricultural Research Institute (NARI) in 1996 (E. C. Sitapai, 2012).

Since then, NARI has released several farmer impact crop/livestock technologies, including pathogen-free planting material (NARI, 2010).

Future production of staples has been given a boost with the release by NARI of the pathogen-tested (PT) potato and sweet potato varieties. The use of PT material will immediately increase farm yields by over 80%. The tubers are of quality shape, and free from pest and diseases. Farmers using PT material will definitely enhance their income, and household food security status.

Extension support for food and horticultural crops is provided by the Fresh Produce Development Agency (FPDA), established in 2005.

Livestock extension is currently supported by several agencies, both public and private. Livestock Development Corporation (LDC) is a public company that manages cattle and abattoirs previously operated by NDAL. LDC is presently undergoing a restructuring program that will grant the organization responsibility as the lead agency for livestock sector (E. C. Sitapai, 2012).

Since 2007 an Australian Government assistance program called the Agricultural Research & Development Support Facility (ARDSF) has assisted the NARS institutions to realign their research strategies to focus on development, rather than merely generating, transferring, and adopting technologies. Its adherence to the concept of Agricultural Research for Development (AR4D) is a paradigm shift from a linear model of research to accommodating integrated and collective actions of stakeholders to improve technologies, policies and institutions (NARI, 2011). The AR4D approach is considered a component of a wider system where a variety of outcomes from different sectors must be generated in order to enhance people’s livelihoods.

The National Department of Agriculture & Livestock (NDAL) developed a National Agriculture Development Plan (NADP) in 2006. The Plan was approved by the Government in 2007, with a resource framework of one billion Kina over ten years (GOPNG, 2007). NADP has 10 thematic areas, one of which is Research and Extension for Development with a ten-year funding estimate of K 264 million. It was anticipated that the NADP would facilitate improvement and effectiveness of public institutions and agricultural programs, resulting in community wide impact and growth (5% annually) of the sector (E. C. Sitapai, 2012). The disadvantage was that there were frequent changes of the management and staff cuts resulting in programs being not coordinated and implemented as well as anticipated.

The role of NDAL as a lead sector agency is still evolving and the process is being managed under a functional and expenditure review. There is a widely held view of the agricultural industries and stakeholders that the Department must be immediately revitalized into a vibrant central entity with innovative capacity and modern skills to manage the diverse private and public
stakeholder collaboration in all aspects of agricultural and rural development (Sitapai, 2011). The reform must strengthen NDAL’s key role of policy and strategic planning for the sector, and the resourcing of agricultural development initiatives, including public support for extension.

### 13.1.2.5 Extension agencies and rural advisory service providers

The provision and support for agricultural extension is largely a government (public sector) responsibility. Extension service is offered along commodity lines, using the T&V system or driven by general rural development programs. The activities are targeted at the district and village level and the success of the programs is dependent on availability and quality of resources (human and financial). However, since 2000, several non-governmental organisations (NGOs) and community-based organisations (CBOs) have also become actively involved in the delivery of agricultural services (Sitapai, 2011).

Most of these agencies are linked to donor and financial institutions, churches, and farmer groups or associations (Lahis, 2008). The emergence of such organisations in recent years is in response to the break-down of government service delivery efforts of the past. The NGOs and CBOs are mainly voluntary organizations that seek to facilitate local area development. Several women’s groups have also been formed to address development agendas that are specific to women. However, the capability and capacity of these private service providers varies considerably, and some are weak in their analyses of community needs and in the formulation of desired project interventions that deliver real benefits to the people on a sustainable basis (Sitapai, 2011). For example, Trukai Industry and Niugini Table Bird (NTB) are focused on cattle and poultry respectively for commercial purposes and with less community needs-based extension.

### 13.1.2.6 Funding of extension

Government funding for agricultural extension programs has been variable over the last twenty years. Only three external donor agencies (Asian Development Bank, Australian AID, New Zealand AID) have supported agricultural extension over the last twenty years (Sitapai, 2011). Private sector participants vary in their resource levels, organizational capacities, and relationships with Government funded extension programs.
In 1992, Asian Development Bank (ADB) estimated that extension services in all provinces of PNG (excluding Bougainville) cost K30 million annually (ANZDEC, 1993). The study also showed that 90 percent of this funding went to salaries of officials and only K3 million (or K0.17 million per province) was available for goods and services. This is barely sufficient to meet recurrent costs and start any long term extension activity. Although provincial funding has improved over the last ten years with increased Government support under the District Support Incentive Program (DSIP) and other grants, the support for agriculture services overall has not improved significantly, relative to other sectors like education and health.

Recently, the World Bank and the Government of PNG committed US$55 million to a project known as Productive Partnerships in Agricultural Projects (PPAP) in PNG specifically to improve smallholder cocoa and coffee producers through improvement of performance. This project supports both public and coffee and cocoa extension agencies to roll out the project that ends in 2019 (World Bank, 2014). The next sub-section gives a synopsis of the three (3) main extension approaches practiced in PNG.

13.1.3 Extension approaches

Past reviews of agricultural extension approaches in PNG (ANZDEC, 1993; Dekuku et al., 2005; GOPNG, 2000; R. E. McKillop, 1994) have shown a variety of methods, operating environments, and outcomes from interventions. To date, no assessment and evaluation of the various extension methods have been undertaken in terms of method impact; sustainability (financial, human and environmental); effectiveness and efficiency. However, a general conclusion drawn from these reviews is that no one extension model will suit all purposes and models more suited or appropriate to specific areas, needs, or circumstances need to be identified and promoted (Dekuku et al., 2005; Lahis, 2008). However, there are some success stories of a commodity specialised approach extension practiced by the oil palm industry by New Britain Palm Oil Limited (NBPOL) that needs further modelling.

The agricultural extension approaches used in PNG over the last 50 years can be grouped into four models: technology transfer; human resource development; private sector assisted delivery; and participatory or farmer-demand driven extension (Sitapai, 2011). Broader discussion of agricultural extension practices has been described in Chapter 3. This section focuses on specific programs especially in PNG that lie under these previously described practices.
13.1.4 Technology transfer

The main method of technology transfer within PNG is the training and visit (T&V) mode of approach and has been in practice from pre-Independence period (prior to 1975) to the present day. Technology transfer involves a top-down approach where planning and prioritisation is carried out on a national basis by the National Government. Specific recommendations about the practices farmers should adopt are delivered to extension agents from a Provincial and District level on to farmers. In PNG, the technology transfer system is administered through two main modes; the general extension at provincial and district level, and industry-driven service delivery. The cocoa extension program sits within a broader program of crop and livestock extension under T&V.

The effect of the T&V system of extension is most significant with cash crops over the last 35 years (Sitapai, 2011). Cash crops (for example coffee, cocoa and coconut) are crops grown for commercial purposes and designated for the export market. Overall, the industry-driven or commodity extension approach offers the opportunity to develop a performance-oriented institutional culture, and is much more focused and cost-efficient than the generalist mode in provinces. The smallholder cash crop sector that is grown mainly by rural farmers in PNG has proven the opposite. In many instances, rural villagers have readily adopted cash crops with relatively little advice or assistance from Government extension (Bourke et al., 2009).

13.1.5 Human Resource Development Approach

This paradigm was popular in the earliest days of extension in developed countries, when universities gave training to rural people who were unable to enrol at the universities (Agriinfo, 2015). It continues today in the outreach activities of colleges and universities around the world including the PNG University of Natural Resources & Environment (UNRE), and the Agriculture Department of PNG University of Technology (Unitech). The approach employed is conventional method by means of top-down teaching methods, nevertheless farmers decide how best to use the knowledge acquired (NAFES, 2005b).

The UNRE has an outreach program called ‘Integrated Agricultural Training Program’ (IATP). It is an extension arm of the University which focus on improving the livelihood of rural population. The extension method employed is ‘train and visit’ (T&V). The training manuals of diverse livelihood programs are developed and imparted to specific clients (farmers). Similarly Agriculture Department of Unitech has its outreach body called South Pacific Institute for
Sustainable Agriculture and Rural Development (SPISARD). It’s a vehicle to reach farmers. It’s a pluralistic extension method with educational institute approach. The aim is to carry out holistic improvements to the farming system practiced through capacity building, research, training, and extension and technology transfer through model village concept (Unitech, 2013).

The IATP and SPISARD are institutional driven with activities alien to understand traditional knowledge and culture, linking of food production, income generating activities, food security, research and innovation capacities etc. with the aim to improve people’s livelihood in cost effective and a sustainable manner.

13.1.6 Private sector assisted delivery

Private sector assisted delivery extension are donor funded programs with various projects managed by private organisations to deliver certain agricultural services or innovations to farmers. The two prominent programs piloted are Smallholder Support Services Pilot Project (SSSPP), Bris Kanda Inc., and Fresh Produce Development Authority (FPDA). Both have extension programs contracted out to an extension specialist who train leader farmers as village extension workers (VEW) that further train the farmers.

Private Sector extension mode has been piloted in PNG using participatory approaches to promote pre-determined packages of technology and agricultural innovations. It is being driven by donors and the approach entails mobilisation of private strategic partners or service providers to address farmers’ enquiries with technical prescriptions.

Participatory methods or farmer-demand driven extension being used in PNG include Farmers’ Field School (FFS) concept, Participatory Action Research (PAR) or Participatory Technology Development (PTD) (E. C. Sitapai, 2012). FFS is being trialled by Cocoa Coconut Institute (CCI) to lift level of cocoa farm management practices in curtailing losses to cocoa pod borer. It is a group-based learning process used in several countries to promote integrated pest management (IPM) strategies. FFS brings together concepts and methods from agro-ecology, experiential education and community development (E. C. Sitapai, 2012).

The next section presents the main constraints and challenges in agricultural extension in PNG.
13.1.7 The Challenges of Agricultural Extension in Papua New Guinea

Over recent decades, agricultural extension has played a vital role in agricultural development in PNG. The extension service is still a fundamental investment in enhancing human and social capital of the rural population in the country (E. C. Sitapai, 2012). However, extension services over the years have faced huge challenges and perhaps require urgent extension reform to provide the fundamental support to rural populations. Some of the key challenges believed to hamper the deliverance of agricultural extension services in PNG mainly relate to the low priority Government places on agricultural investment compared to other investment needs such as health and education. Caven and McKillop (2001) identified some of these constraints as follows:

i. a large administrative structure that is expensive to maintain
ii. inadequate provision for spending on operations and maintenance
iii. involvement of public extension agencies in activities that can be more efficiently carried out by the private extension agencies
iv. a poor ability to respond to and execute technical assistance
v. limited numbers of trained extension, scientific, and management staff
vi. a costly decentralisation of services, with strong political pressures to provide government services in remote rural areas
vii. weak links between research and extension services
viii. unsustainable and inconsistent annual budgetary support, which is not conducive to achieving long-term outcomes and
ix. a relatively low level of public investment in infrastructure such as buildings and equipment.

The other exacerbating factor is that the extension services are over-reliant on Government initiatives to stimulate programmes, including the use of grants and subsidised services. Consequently, there has been an increase in perceptions of negative effects and according to Caven and McKillop (2001), these include:

i. expectations that capital can be generated by political activity and subsidies
ii. orientation of extension services toward administration of subsidies
iii. general favouring of privileged groups in access to grants and subsidised services
iv. inhibition of the development of managerial skills and
v. inefficient allocation of scarce resources.
13.1.8 Section Summary

Extension in PNG has evolved since the colonisation era with emphases in plantation tree cash
crops. The complexity in the agricultural extension service has evolved within political,
administrative, and institutional reforms over several decades. Government extension services
have a primary focus on increasing production and productivity of cash crops (including cocoa)
and less emphasis on subsistence farming, which are the basis of vast rural population and the
foundations of smallholder cocoa production. Extension services are fundamental to ensure
research outputs, development of farmer groups, improved inputs, and together with other
aspects of rural development support, actually meet farmers’ needs and demands. An effective
extension system is vital. Hence, having a clear holistic application of agricultural extension
systems in PNG may provide some directions for researchers and extension agents for
interventions.
13.2  APPENDIX 6.1: DETAILS OF THE DATA COLLECTION PROCESS

13.2.1  Key Informant Interviews Interview Protocol

**Project Name:** Smallholder Cocoa Production: Farmers’ Livelihood and Factors Influencing Decision – Making in Technology Adoption in Papua New Guinea

To the Participant,

Hi, I’m William Kerua and I’m from the School of Agricultural and Wine Sciences at Charles Sturt University.

I’ve asked to come and speak with you about a range of issues affecting farming / cocoa production in this region / province.

Thank you for agreeing to participate in this interview. This research project is a part of my university PhD studies.

I have a summary Information Sheet on what the research project is about which I will leave with you, but before I look at that, I’d like to ask you some fairly general questions about your experiences / understanding and involvement in this topic.

Before I start I want to assure you that anything you say is confidential – that is, what you tell us will not be identified with you in anyway, although I would like your permission to use the information you provide us, in our report which will only be used within this subject, not for general or wider publication. This means that while I might report on a general issue you raise, your name will not be used or seen in print and the information will not be presented in a way that will enable anyone to be able to identify you with that information. I am the only person who see the ‘raw’ data you provide me. I can provide you a written copy of what I record if you’d like and you can withdraw from the interview at anytime.

I do need your permission to go ahead by signing this consent form.

I can also tell you that the Charles Sturt University School of Agricultural and Wine Sciences has approved our research and if you have any concerns you can contact them at the address at the bottom of the information sheet.

Thank you, now I would like to begin by asking you some questions.
13.2.1.1 Farmer Key Informant Questions

Target Participants: Leader Farmers

Q1. Tell me about what’s happening in your local community?
- Tell me about your involvement in the community?
- Tell me about your farm activities.
- Can you give me details of your family, crops/animals raised, farm size?
- What do you do to meet your essential needs?
- What are some of the government services and infrastructures you have in your community?
- What are other services that are lacking in your community?
- Why do you think you should have these services?

Q2. Tell me about how long you’ve been here and how things have changed?
- Tell me about how things were like in the past?
- What was it that you liked in the past that have changed now?
- Tell me about any changes in your way of farming?
- What do you think have caused those changes?
- What are some improvements you see in your life style?

Q3. Tell me about the big issues affecting your farm now?
- What are some problems you are currently facing in your farm?
- What kind of help have you soughted?
- How do you feel about the efforts of extension agents towards your farming activities?
- How do you feel about the efforts of agricultural researchers towards your farming activities?
- Tell me what cocoa means to you?
- How do you compare the growing of cocoa to other cash crops?
- What are some problems you face in growing cocoa?
- Why are they problem to you?
- How do you get support in cocoa production from your family members?

Q4. What would you like to see changes about your way of farming now?
- How do you wish to see your cocoa block run?
- How do you wish to see the extension services to the farmers?
- How do you wish to see the role cocoa research should play in cocoa production?
- What is your view on the future of cocoa production in your region?
- What kind of changes you wish to see in you and your family?
- How can you achieve these changes?
13.2.1.2  Researcher / Extension Key Informant Questions

Target Participants:  Extension & Research Officers and Managers

Q1. Tell me about what’s happening in your organisation/institution?
   - Tell me about your organisation or institution?
   - Tell me about the role you play in your organisation/institution?
   - Tell me about your clients (farmers)?
   - Tell me about you and your organisation’s relationship with the community?
   - Tell me about the support you get from government?
   - Why do you think you should have these support?

Q2. Tell me about how long you’ve been working here and how things have changed?
   - Tell me about how things were like in the past?
   - Tell me about any changes in the role you play?
   - What do you think have caused those changes?
   - Can you tell me how you see farmers in relation to your role and organisation?
   - What are some improvements you see in your employment terms and conditions?
   - What is your view on the government policies on agricultural commodities that you are dealing with?

Q3. Tell me about the big issues affecting your organisation or institution now?
   - What are some problems you are currently facing in your organisation?
   - What kind of help have you or your organisation sought?
   - *How do you feel about the extension services towards the farmers?
   - *How do you feel about the efforts of agricultural research to meet the needs of the farmers to improve and increase production of crops?
   - Tell me how you see cocoa in the farmer’s way of life?
   - What is the support of the government to the cocoa industry?
   - What are the problems farmers’ encounters in growing cocoa?
   - Why are they problem to farmers?
   - What are some cocoa technologies developed and why do you think it is important to the farmers?
   - What is your view on the perceptions of the farmers towards the cocoa technologies developed?
   - Give a brief account of how you see the technologies being used by farmers and changes in production?

Q4. Based on what you said earlier, what would you like to see changes to occur?
   - How do you wish to see the government’s policy on cocoa production?
   - How do you wish to see the role extension agents and research institutions should play in cocoa production?
   - How do you wish to see the problems of cocoa production be addressed?
   - What is your view on the future perspective of increase cocoa production in PNG?
   - How can you achieve these changes?
13.2.2 Semi-Structured Interviews Interview Protocol

**Project Name:** Smallholder Cocoa Production: Farmers’ Livelihood and Factors Influencing Decision – Making in Technology Adoption in Papua New Guinea

To the Participant,

Hi, I’m William Kerua and I’m from the School of Agricultural and Wine Sciences at Charles Sturt University in NSW, Australia.

I’ve asked to come and speak with you about a range of issues affecting your community, farming and cocoa production in this province.

Thank you for agreeing to participate in this interview. This research project is a part of my university PhD studies.

I have a summary Information Sheet on what the research project is about which I will leave with you, but before I look at that, I’d like to ask you some fairly general questions about your experiences/understanding and involvement in this topic.

Before I start I want to assure you that anything you say is confidential – that is, what you tell us will not be identified with you in anyway, although I would like your permission to use the information you provide us, in our report which will only be used within this subject, not for general or wider publication. This means that while I might report on a general issue you raise, your name will not be used or seen in print and the information will not be presented in a way that will enable anyone to be able to identify you with that information. I am the only person who sees the ‘raw’ data you provide me. I can provide you a written copy of what I record if you’d like and you can withdraw from the interview at any time.

I do need your permission to go ahead by signing this consent form.

I can also tell you that the Charles Sturt University School of Agricultural and Wine Sciences has approved our research and if you have any concerns you can contact them at the address at the bottom of the information sheet.

Thank you, now I would like to begin by asking you some questions.
13.2.2.1 Farmers Semi-Structured Interview Schedule

Smallholder Cocoa Production: Farmers’ Livelihood and Factors Influencing Decision –
Making in Technology Adoption in Papua New Guinea

You will not be identified as a respondent without your consent. You may, at any time, withdraw your participation, including withdrawal of any information you have provided. If you complete the interview, however, it will be understood that you have consented to participate in this research and consent to publication of the results of this research with the understanding that anonymity will be preserved.

Code No.
Name of interviewee:____________________________________
Location of interview:____________________________________
Remarks:_____________________________________________________________________________________________
________________________________________________________________________________________________________

A. Context: What do farmers do? (community and demographics)

Question 1: Tell me about what’s happening in your local community? *If necessary, probe for...*

☐ Can you tell me about your community/village?
☐ Tell me about your involvement in the community?
  • Role in community
  • Associations or farmer group involvement etc.
☐ How about your farm activities?
  • Types of crops and animals.
  • Land size and usage
  • Land tenure
☐ What about yourself and family?
  • Education level and skills
  • Responsibilities
  • Cosmo-politeness
  • Culture
  *(Demographic information- refer Table1)*

Clarity questions

☐ Can you tell me anything else?
☐ Can you expand a little on this?
☐ Can you give me some examples?
☐ What did you mean by that?
B. Understanding the current issues (community/personal assets and accessibility to government services)

Question 2: From your perspective, what are the most important problems faced by farmers (you) and the community? If necessary, probe for...

- In terms of the essential government services and infrastructures you have in your community? (transport, school, market facilities, health, water, electricity)
- What institutions do you seek advice or assistance? And why?
- What are the available natural resources?
- What law and order issues affecting your community?
- Tell me about the potential threats that affect your way of life?

Clarity questions

- Can you expand a little on this?
- Can you tell me anything else?
- Why?
- How accessible are these services? How you access these resources?
- Can you give me examples

C. Understanding the current issues (farmers' livelihood strategy)

Question 3: From your perspective, what are the most important things or activities you consider in your way of life? If necessary, probe for...

- Tell me about the kinds of activity you do as a means of living?
- What activity(s) do you allocate more resources to?
  - Why diverse into many other activities than farming only?
  - Tell me how you go about making decisions in livelihood activities?
  - Who makes more decisions (farming, welfare, financial) in family?
  - Do culture and beliefs matter in decision-making process? Explain how?
  - How do you react to new ideas or technologies that are introduced to you?
  - Tell me what cocoa means to you?
  - Compare the growing of cocoa to other cash crops (economic, social, ecological, ease etc)
  - Importance of cocoa in your life?
  - Who supports you in cocoa farming?
  - Problems in cocoa farming?
  - Tell me how you value your traditions and culture?
  - What is you view on the role of extension and research agents?
  - From your perspective, what are the biggest opportunities for your community?

Clarity questions

- Can you tell me anything else?
- Why?  □  Who?  □  How?
- What kind of support? Can you give me some examples?
- What did you mean by that? Explain more?
D. Understanding the changes (farmers view of changes over last 5 yrs)

Question 4: From your perspective, what are some of the changes you experienced in your way of life comparing to 5 years ago? If necessary, probe for...

- Tell me about how things were like in the last 5 years or so? (Probe into: govt services, infrastructure, agri. advise, behaviour/attitude, population, law & order, culture, farming, food supply, network etc)
- What was it that you liked in the past that have changed now?
- Tell me about any changes in your way of farming?
- What do you think have caused those changes?
- What are some improvements you see in your life style?

Clarity questions

- How about current situation?
- Can you tell me anything else?
- Why?
- Can you give me some examples?
- What did you mean by that?

E. What about the future?

Question 5: What do you like to see changes about your way of life over the next 5-10 years? If necessary, probe

- What do you wish to see the government services to your community?
- What kind of changes you wish to see in you and your family?
  - How can you achieve these changes?
- How do you wish to see your cocoa block run?
- How do you wish to see the extension services to the farmers?
- How do you wish to see the role cocoa research should play in cocoa production?
- What is your view on the future of cocoa production in your region?
- What is your wish in the future of your environment in the community?
- What do you wish to see in other livelihood activities apart from cocoa farming?

Clarity questions

- Why?
- Can you give me some examples?
- What did you mean by that?
- Can you tell me anything else?

Thank you for your time to answer these questions.
Table 1 Demographic data

| a. Age: ______ | b. Sex: ______ |
| c. Marital Status: ______ |
| d. No. of Children(s): < 5 years old: ___ 6-14 years old: ___ > 14 years old: ___ |
| e. Education of family members: |
| Farmer: __________ Spouse: __________ |
| Children: Primary: __ High School: __ College: __ Uni: __ |
| f. What skills do you have? ____________________________ |
| g. Farming experience: _____ years. |
| h. Have you travelled out of province? ______, how many times? __________ |
| i. Type of house: _______ and no. of people leaving in the house? ______ |
| j. Family members role in livelihood: |
| Farther: ____________________________ |
| Mother: ____________________________ |
| Children: ____________________________ |
| Other dependents__________________________ |
13.2.2.2  Research and Extension Officers Semi-Structured Interview Schedule

Smallholder Cocoa Production: Farmers’ Livelihood and Factors Influencing Decision – Making in Technology Adoption in Papua New Guinea

You will not be identified as a respondent without your consent. You may, at any time, withdraw your participation, including withdrawal of any information you have provided. If you complete the interview, however, it will be understood that you have consented to participate in this research and consent to publication of the results of this research with the understanding that anonymity will be preserved.

Code No.
Name of interviewee: ______________________________________
Location of interview: ______________________________________
Remarks: ____________________________________________________________________________________________
________________________________________________________________________________________________________

1. Can you tell me about yourself and what’s happening in your organisation? If necessary, probe for...
   - Tell me about your organisation or institution?
   - Tell me about the role you play in your organisation/institution?
   - Tell me about your clients (farmers)?
   - Tell me about your (and your organisation’s) relationship with the farmers and the community?
   - How about your organisation’s relationship with the farmers and the community?
   - Tell me about the support you get from government?
   - Why do you think you should have these support?

2. Tell me about how long you’ve been working here and how things have changed?
   If necessary, probe for...
   - Tell me about how things were like in the past?
   - Tell me about any changes in the role you play?
   - What do you think have caused those changes?
   - In your view do you think you have achieved the goals of your organisation or institution? If yes or No explain how/why?
   - What are some improvements you see in your employment terms and conditions?
   - What is your view on the government policies on agricultural commodities that you are dealing with?

3. Tell me about the major issues affecting your organisation/ institution now?
   If necessary, probe for...
   - What are some problems you are currently facing in your organisation?
   - What kind of help have you or your organisation sought?
   - *How do you feel about the extension services towards the farmers?
- How do you feel about the efforts of agricultural research to meet the needs of the farmers to improve and increase production of crops?
- Tell me about your approaches and network with farmers?
- What is the support of the government to the cocoa industry?

4. What is your perception of your clients’ (farmers’) way of life? 
   *If necessary, probe for...*
   - Tell me about how you see the farmers in general of their way of life and how they respond to situations?
   - Tell me about your knowledge of farmers’ culture and traditions?
   - What is your view of the farmers’ interest and commitment towards agriculture activities?
   - In your view what are other activities (non-farming) you think farmers also have interest in? Why?
   - In your view what are the major problems or issues affecting the farmers’ way of life?
   - Why are they problems to farmers?

5. Tell me how farmers respond to you or your organisation/institute in regard to services you offer? *If necessary, probe for...*
   - Describe farmers’ behaviour towards Extension (and/or Research) Officers of your organisation?
   - Tell me how you see cocoa in the farmer’s way of life?
   - What are the problems farmers’ encounters in growing cocoa?
   - Why are they problem to farmers?
   - What are some cocoa technologies developed and why do you think it is important to the farmers?
   - What is your view on the perceptions of the farmers towards the cocoa technologies developed (including IPDM)?
   - Give a brief account of how you see the technologies being used by farmers and changes in production?
   - In your view, what outcome(s) do you think your clients (farmers) benefit from the kind of services you provide?

6. Based on what you said earlier, what would you like to see changes to occur? *If necessary, probe for...*
   - How do you wish to see the government’s policy on cocoa production?
   - How do you wish to see the role extension agents and research institutions should play in farmers’ livelihood?
   - How do you wish to see the role extension agents and research institutions should play in cocoa production?
   - How do you wish to see changes in extension approach and methods towards farmers?
   - How do you wish to see the problems of cocoa production be addressed?
   - What is your view on the farmers’ interest in cocoa production?
   - What areas do you want to see farmers to improve in?
   - What is your view on the future perspective of increase cocoa production in PNG?
   - How can you achieve these changes?

------------------------------------------------------------------------------------------

Thank you for your time to answer these questions.
13.3 APPENDIX 7.1: SOCIO-DEMOGRAPHIC CHARACTERISTICS

This appendix is an elaboration of Chapter 7 that presents socio-demographic characteristic of Gazelle District of East New Britain Province (ENBP) and Huon Gulf District of Morobe Province (MP). The study sites are located in these two districts.

13.3.1 Introduction

Socio-demographic information is important especially for planning and to understand the trend of development as it provides a rich data of demographic information of a society of interest. Therefore this appendix provides the basic socio-demographic characteristics of the districts where the study was conducted, drawn on data compiled by the National Research Institute (NRI) in 2007.

The demographic data is important for understanding the associations of socio-demographic factors with the quality of livelihood outcomes of the study.

13.3.2 Vudal and Burit Villages of East New Britain Province

Firstly, the Vudal and Burit villages come under the Gazelle District. Details on demographics include the descriptions of district and village population, languages, health services, education and literacy level, average household size, agricultural activities, and infrastructure as tabulated in Table 13.1 Summary of general socio-demographics of the Gazelle District (2007).

The total population of the Gazelle District in 2007 was 89,776 persons of which 55.3 percent were males and 46.7 percent were females (NRI, 2010, p. 162). The total number of households in the Gazelle District in 2007 was 15,726 (NRI, 2010, p. 162) suggesting that the average family comprised six members. The total area of the Gazelle District is 3700 km² and occupied area was 1176 km² and the population density of the occupied area was 76.3 persons/km² or about 13 households in a square kilometre (km²). The native language commonly spoken is Kuanua along with Pidgin. The total number of schools from elementary to high school was 188 and with an
average literacy rate of 85 percent (NRI, 2010). There are nine health centres and 25 aid posts in Gazelle District.

Table 13.1 Summary of general socio-demographics of the Gazelle District (2007)

<table>
<thead>
<tr>
<th>Population</th>
<th>Male (%)</th>
<th>Female (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>89776</td>
<td>53.3</td>
</tr>
<tr>
<td>&lt;15 years</td>
<td>37760</td>
<td>52.6</td>
</tr>
<tr>
<td>15-64 years</td>
<td>49750</td>
<td>54.1</td>
</tr>
<tr>
<td>&gt;65 years</td>
<td>2266</td>
<td>49.0</td>
</tr>
<tr>
<td>Households</td>
<td>15726</td>
<td>(av: 5.7/family)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health Number and population per officer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Officers</td>
</tr>
<tr>
<td>Nursing Officers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of population per facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Centre</td>
</tr>
<tr>
<td>Aid Post</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Economic Activity Main agricultural activities of households</th>
</tr>
</thead>
<tbody>
<tr>
<td>% engaged</td>
</tr>
<tr>
<td>Food crop</td>
</tr>
<tr>
<td>Cocoa</td>
</tr>
<tr>
<td>Betel nut</td>
</tr>
<tr>
<td>Coconut</td>
</tr>
<tr>
<td>Livestock</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Infrastructure Road, electricity and water</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are some minor roads in the hills and valleys in the north east and west connecting to the major service centre of Kokopo. Electricity is only accessible to those living near major roadsides. Most water is collected from rainwater via tanks and underground wells.</td>
</tr>
</tbody>
</table>

13.3.3 Wampup and Gabsongkeg villages of Morobe Province

Secondly, the Wampup and Gabsongkeg villages come under Huon Gulf District of Morobe Province. The discourse on demographics include the description of the Huon Gulf District and village population, languages, health services, education and literacy level, average household
size, economic activities, and infrastructure. Most villages are accessible by roads and their main activity is agriculture production.

The total population of the Huon Gulf District in 2007 was 59,523 persons, of which 53.1 percent were males and 46.9 percent were females (NRI, 2010, p. 136). The total number of households in Huon Gulf District in 2007 was 10,603 (NRI, 2010, p. 136), the average family comprising six members. The total area of the Huon Gulf District is 7,401 km² and occupied area is 1906 km² and the population density of the occupied area was 31.2 persons/km² or about five households in a square kilometre (km²). The native language commonly spoken is Yabem and Wampar along with Pidgin (Tok Pisin). The total number of schools from elementary to high school was 103 and with an average literacy rate of 73.5 percent (NRI, 2010). There are four health centres and 28 aid posts. Most villages are accessible by roads or boats along the coast and their main activity is agriculture production and fishery in the coast. Error! Reference source not found. presents the summary of the socio-demographic data.

Table 13.2: Summary of socio-demographic data of the Huon Gulf District (2007)
13.3.4 Section Summary

The appendix provided the socio-demographic information for the two study districts of Gazelle District of ENBP and the Huon Gulf District of MP. The study sites namely Vudal and Burit are under Gazelle District and Wampup and Gabsongkeg are under the Huon Gulf District. As per the data it is apparent that Gazelle District is highly populated but with low land mass while Huon Gulf District is less populated and has high land mass of both occupied and unoccupied. Data also varies with the number of schools and health services. Huon Gulf have higher number of schools but less health centres while Gazelle is the opposite. Nevertheless, relatively it appears that Gazelle District and the people are well off than the Huon Gulf simply the land mass is huge and people are scattered than Gazelle are all concentrated in a small land mass and government services can easily be provided to all locations.

Hence, the aim is to understand the trend of development as it provides a rich data of demographic information of the district and the people of the study areas.
13.4 APPENDIX 7.2 POLITICAL ORGANISATION

13.4.1 Introduction

This section is part of the results outlined in Chapter 7 that presents the political system from the national level to village level. All societies have some sort of political systems for leadership and governance and vary from society to society. In the study sites, the political system becomes paramount as individuals within the system generally have authority related to broad areas of concern of their family and society. Additionally the basic infrastructural development (roads, bridges, buildings, etc.) and services (health, education, electricity, etc.) in the study communities are provided by the government and so is important to understand the government structure and the reforms over the years and its implication on peoples livelihoods.

Political organisations at the village level are supported by a higher level of political organisations from the national, provincial and local level Governments. Each society in the region has their own culture and customs and comes with its own village political system. While the district, provincial, and national level government is uniform throughout the country, the management and leadership style is what differs. The next sub-section describes the government reform system, describing how services are delivered directly to the village level.

13.4.2 A synopsis of the Papua New Guinea Government Reform System

Papua New Guinea proclaimed Independence from Australia in 1975 and became an active member of the Commonwealth. Papua New Guinea has three levels of Government: National, Provincial and Local. There are 22 provinces in Papua New Guinea. Just after the independence (1977) there was an enactment of the Organic Law on Provincial Governments and the Provincial Government System was created, resulting in the decentralisation of political and some financial powers from the National Government to the provinces and thus the establishment of a two-tier government system (Kwa, 2006). However, this event has been associated with serious political and financial mismanagement coupled with very poor service delivery to the rural population (Gumoi, 2002). Consequently in June 1995 the National Parliament repealed the 1977 Organic Law on Provincial Governments and replaced it with the Organic Law on Provincial Government and Local Level Governments (Kwa, 2006). Each of the 22 provinces in the country now has an elected Governor (MP) who governs the province. An elected member of parliament (MP) represents each district in the province. Each district, then consists of a number of Local Level Governments (LLG) depending on the population. Each LLG is represented by a Council
President (usually elected by Ward Councillors of that LLG) and each ward is represented by a Councillor (elected by Ward or village members). Along these chains of political hierarchical systems comes with its bureaucracies and administration portfolios.

The new reform legislation decentralised powers further to the Local Level Governments (LLG) including some law making powers especially in health and education. These reforms geared to seek to enable better cooperation between both national and provincial politicians on development issues affecting the provinces. At the administrative level, the legislation provides for local participation and funding to district with the hope of enabling local populations to be closely involved in developments affecting them, leading to greater economic development at the district and village levels. Despite the good intention of the new reform legislation on decentralisation to LLG level, it appears to be good on paper, but the reality on the ground is it is dysfunctional in most provinces. It puts pressure and constraints on public servants at the LLG level to carry out task as an Officer said:

‘At the same time there is only one extension officer in the LLG to address some thousand for people and it’s pretty difficult to monitor all projects or cover all areas in the district’.

Often there are delays of funds being released from the National Government to reach the LLG levels.

‘There are hold ups in our plans because we are interrupted with unavailability of funds when we need it most to complete the part of the project and it all collapses. We have a problem of funding’.

There are many other issues being faced at the Provincial and Local Level Government in delivering services other than solving the problems as anticipated by the reforms. Again, it depends on individual politicians and their relationship with their administrators. For example; most members of parliament (MPs) of East New Britain Province work closely with their administrators in their respective Districts and have delivered better services than the MPs of Morobe Province and other provinces in the country.

13.4.3 Local Level Government (LLG) and the role of Ward Councillors

Local Level Government (LLG) is the third level of government directly governing the rural areas through the Ward Councillors. The LLG system is unified in all districts of PNG including Huon Gulf in Morobe Province (MP) and Gazelle Peninsular of East New Britain Province (ENBP) where
the study was conducted. Within each LLG are structures of wards usually made up of several villages and each Ward is represented by a Councillor (also called a Ward Member).

At the administrative level, the legislation provides for local participation and funding to district levels with the hope of enabling local populations to be closely involved in developments affecting them, leading to greater economic development at the district and village levels through a Ward Councillor. Therefore, the Local Level Government (LLG) through the Ward Councillors plays a significant role in representing the villages within the wards. The Councillors are highly respected as they understand the culture and traditions of the community and make rulings and decisions that bring harmony to the community and their livelihood. A Ward Councillor is elected by the ward members in a formal election to represent their ward in the Local Level Government (LLG). Apart from the representation role in LLG, the Ward Councillor solves disputes in the community, and will liaise and lobby with the LLG assembly to bring in essential government services like, health, education, roads, electricity, etc., to the villages in the ward (community). The Ward Councillor plays a key role in the development of the community and bearing as a government agent.

Despite the important role the Councillor plays, it has been a practice that traditional village elders or a good communicator in the community (normally uneducated) is often preferred by community members. Most councillors do not have attributes and skills required to be successful in facilitating and bringing in amicable development and / or services into the community. A lack of education often means Councillors lack important skills or attributes in critical thinking, creativity, collaboration and networking, all considered fundamental to bringing change into the community. Additionally, and reflective of the culture surrounding such positions, educated people often perceive that competing for a position such as a village Councillor is degrading to their status. Consequently, low education standards amongst Councillors are seen to be a contributing factor to slow development not only in the study areas, but also in other parts of the country.

Apart from Ward Councillor of the community, each village elects a village magistrate for the village court that addresses disputes. Pastors and church elders also play a significant role in counselling and providing advice. So Ward Councillors, church elders, and village magistrates tend to be leaders and are often of important lineages. However, nowadays the community also considers business people, office workers or a well-educated member of the community as a leader as well. The community members look upon such leaders for advice and directions.
The system of LLG appears to be practical, but the National Government does not commit to budgets as required, nor does it dispatch funds on schedule thus affecting service delivery in the community. Therefore, essential Government services to empower the farmers like credit facilities, agricultural extension advice, marketing, electricity, water supply and sewerage and improved roads, are generally lacking and are a major concern of all the villages in the study sites.

13.4.4 Section Summary

This appendix provides a brief account on the political system from the national level to the council level in the community. People in all communities including the study sites rely on the government for basic essential services like road, electricity, water supply, schools, and health centres, and so on to enhance their livelihood. Therefore this section of Chapter 7 provides such information to understand the government structure and the reforms over the years and its implication on people’s livelihoods.
13.5 APPENDIX 8.1: LIVESTOCK RAISED IN THE STUDY SITES

This appendix is an elaboration of Chapter 8 that presents a background on village livestock development in PNG as part of the rural peoples’ livelihood.

13.5.1 Introduction

Village livestock production has been a component of farming systems in Papua New Guinea (PNG) for hundreds of years. It contributes to the food security, cash income, and cultural status of the rural population. The most important domestic animals in PNG are pigs, chickens, cattle, sheep, goats, ducks and rabbits. Horses and swamp buffalo are used as working animals to a small degree. Indigenous pigs and village chickens are popular and would normally be found in almost all villages in PNG. Exotic livestock like cattle, goat, sheep, horse, Australorp chickens, and breeds of pigs, ducks, and rabbits from the late 1800s by colonial administrations, settlers and missionaries (R. M. Bourke & T. Harwood, 2009, p. 173). Some of these livestock were further improved and released by the Department of Agriculture and Livestock (DAL). This section only provides brief account on pigs, chicken, and cattle as these animals are raised in the study areas.

13.5.2 Pigs

Pigs are the most important livestock species in the largely traditional and subsistence rural communities in the study areas and PNG for economic as well as cultural perspectives. Pigs are sold at a high price and are used extensively in many forms of exchange, feasting, bride price, and as symbols of social status and rank. Pigs are used as gifts to establish or maintain social relations and as payments to resolve social disputes (e.g. compensation) or strengthen relationships between individuals, families, clans and tribes. Pigs are also slaughtered during initiation rites, funerals for the dead and during elaborate ceremonies or gatherings where feasting is involved. Therefore, pigs are highly valued and are expensive to buy. Pigs are often tethered or kept in pen enclosures around the homestead but at times they are left loose free ranging. It is mostly the women’s role to raise pigs, however men contribute in building pig house and fences.

Despite the fact that women look after the pigs, but do not necessarily own them, pigs cannot be disposed of without their consent. Availability of feed resources varies among communities. For instance, the Tolai and Wampar people (and other coastal regions), often use coconut, sweet
potato and cassava to feed pigs. In the Highlands, sweet potato tubers and leaves are commonly used for feeding pigs. Pigs are allowed to root in fallow food gardens for worms and this is also seen as a way of cultivating the land in some places. Farmers raise pigs based on their indigenous knowledge and experience.

13.5.3 Chickens

Village native chickens are ranged freely in the household compound and find much of their own food, and from supplementary amounts fed to them by the householder. It is the smallest livestock investment a family in rural communities can afford. They are mainly managed and owned by women and children. Village chickens are reared mainly for consumption and other traditional obligations. Raising chickens for the market (see Figure 1) is the second most important activity for the people of Gabsongkeg village after cocoa.

Plate 13.1: Typical meat birds raised in a village shed mainly for selling.

Raising chickens is a labour intensive work so when the day old chicks arrive at the farm, the man devotes most of his time raising chickens for the next six weeks before they are sold. During this time other activities like cocoa and gardening are neglected or are the burden of the woman and often children as said by a farmer:

'Say in a week, I spent lot more time in looking after chicken than cocoa or other crops. Farming chicken is labour intensive and have to keep up with the company’s management conditions. We grow chicken for the company and they are always visiting to check on us as to meet their requirement and standards so I have to focus on chicken most of my time up until they reach certain weight for the company to pick them up to be slaughtered in their factory. So you can imagine I spend more time in chicken work'.
13.5.4 Cattle

Commercial beef production began in the early 1950s with the establishment of a research centre and breeding stations. In the 1970s a significant effort was made by the government to create a cattle based industry. This was largely unsuccessful and many cattle projects had failed in 1980s (Bourke & Harwood, 2009, p. 175). Cattle were difficult to manage as people were not used to these animals and were not compatible to the animal farming system. Despite the rejection of cattle by many farmers in other cattle introduced provinces, the Markham Valley farmers (including Wampup and Gabsongkeg) are still farming cattle on their land. Partly, because, they have vast land and they belong to a generation that was involved in cattle farming since the 1950s and have roots in their farming system as part of their livelihood. The Wampup villagers especially have raised cattle and horses for a long time and so are mostly into cattle farming today. Most cattle farms are family owned, but a few are owned by co-operatives or clan groups.

Calves are expensive to buy so farmers do their own breeding and range their cattle in a communal grazing land of about 400 hectares. Each household in Wampup village owns at least 2 or more cattle, however, there was one farmer participant who owns 40 cattle (believed to be the largest in the village). Cattle are raised as a form of financial security (asset), as when faced with major financial constraints they would sell one or two of their cattle to meet their financial needs. In doing so, they must buy a replacement calf as to maintain their number of stock or even increase. Cattle are sold to Markham Farm, Trukai Rice, or the public at a price of PGK2500/head, however, price is subject to weight (R. M. Bourke & T. Harwood, 2009). Cattle are also a form of wealth that translates to their status in the community. For example, the more number of herds one owns, the higher his status is in the community. Cattle are also slaughtered for special occasions like church thanks giving, burial rituals, bride price and other exchange ceremonies.

13.5.5 Section Summary

Raising livestock is another livelihood activity of the Tolai and Wampar people. Owning some form of livestock in any PNG society is important as animals are used in many rituals and ceremonies in PNG it is also a stored wealth and brings status of an individual. This appendix gives a brief but informative background on pigs, chickens, and cattle that are raised by farmers in the community under study.
13.6 APPENDIX 8.2: OFF-FARM ACTIVITIES OF FARMERS

This appendix is a further elaboration of Chapter 8 that presents a background of the off farm activities the farmers carry out apart from farming.

13.6.1 Introduction

Off-farming activities generally refer to activities a person engages in another location away from his own farm. For example, a person undertaking a paid job rather than on farm or running a trade store business meaning that the activities do not relate to farming or post-harvest (non-farming) activities. The off-farm activities identified from this studied included general chores and upkeep, paid labour (employment out of own farm), sawmilling, running paid transport (PMV) business, attend to cultural obligations, church activities, and cosmopolitans or leisure time.

13.6.2 Chores and Up keeping

The farmer and his family members would attend to major daily tasks like cocoa, garden work or other important commitments, but they must set time to do necessary chores and/or upkeep tasks as well. Women especially, are burdened with multiple tasks. They feel responsible and take the liberty to make sure the house is in order, dinner must be prepared for the family on time, dishes and laundries are done, house and yard is swept and tidy, children’s well-being is taken care of, making sure the animals are fed, making sure there is enough food for breakfast for the next day, and the list goes on. These routine tasks are carried out daily by women with no complaints. Women, in fact, play a significant role in the wellbeing of their families and the society.

Most men on the other hand would attend to their main daily tasks like pruning cocoa branches in the block or clearing bushes for a new garden say in the morning. During the latter part of the day they would attend to leisure activities. For example; they may mend the leaking roof of the house, or check the family’s livestock, or chop firewood. . Other than that, they would chat with wantoks about village politics, for instance, or may stroll to markets searching for cigarettes and betel nut. So in general men may do heavy tasks but less frequent while women do both heavy and light tasks routinely and with great responsibility. In the village setting, we can postulate that the success of a man depends on how well the wife manages the chores and upkeep of the household.
13.6.3 Paid Labour

In all the study site villages there were many people who had full time or part-time paid employment with various organisations. In Vudal and Burit village, the University of Natural Resource and Environment (UNRE) employs men and women as security guards, cleaners, cooks, carpenters, clerical work and farm labourers. Some of the youths work in grocery shops in Kerevat. A few teach in nearby Primary and Elementary Schools. A good number of ‘elites’ have jobs in Kokopo and other centres like Port Moresby, Lae, Mt Hagen and the Mining Centres. Remittances were sent back to their parents and relatives in the village when requested as the following quote reflects:

‘...my children send me money most times to help me with whatever things I need in the village, even I don’t ask but they still send money to me. It is good to have children who think about their parents’.

Those who live in villages and engage in paid work would spend five to six days of the week at work and may only spare a day or two during the weekend on their cocoa block or garden work. It is obvious that they would not have sufficient time to do farming work or help in upkeep work. In these cases it appears that the woman does all the farm work while the husband is at laboured work. Such circumstances may cause family arguments due to the tension mounted on the woman doing all the heavy work in both garden and home. Therefore, the husband has to remunerate the wife well with part of his fortnightly wages to entice the wife into acceptance. For example, one farmer in this situation revealed:

‘...during the week days I work for the building construction company and weekends I concentrate on my cocoa block and other work in the gardens. I normally give a lot of burden to my wife who does most of the garden and housework when I am out working. I do think about her and give her some money from my pay’.

If a person decides to do paid work, he may find a way to complement his farming activities. He would be fully aware of tasks that may need urgent attention, because he literally lives in the village and goes to work in town (or where ever). Therefore, in many occasions the working husband would hire labourers to help the wife with essential farm work while he is doing paid work. At a time when he decides to quit his job, then he would comfortably fit in.

13.6.4 Sawmilling

There were two farmers (Vudal and Burit) who revealed that after attending training in sawmilling they had become motivated into doing timber work. They bought a portable sawmill or ‘wokobaut somil’ (in pidgin) and usually milled timbers to sell. Both were cocoa farmers,
however, one of them said he had a trucking business but it was not profitable so he ventured into sawmilling. He revealed:

‘One time I saw an advertisement for a sawmilling course, so I attended that course and was motivated, so later I bought sawmilling equipment from another guy for K20,000. I started to cut small and within four months, I was able to buy new equipment for K43,000. So my interest grew as there is no middle man. I cut trees from my own land and sell’.

Another farmer said:

‘So I am interested in the sawmill simply because there is very good income from timber so I spend more time in sawmilling. Cocoa is okay, but after the experience of CPB I am reluctant to concentrate on cocoa again’.

Sawmilling is a lucrative small-scale business that farmers or village cooperatives can venture into if they have good forest on their customary land. However, the forest must be managed well with replanting when necessary to be sustainable.

13.6.5 Other Small-scale Informal Economy

In the study areas there are households who are crossing over from subsistence to a small scale informal economy. They engage in traditional economic activities together with earned income (sawmilling, wage labour, trade stores, distilling home brew.) and cash remittances.

![Plate 13.2: Truck used as small PMV business to carry passengers](image)

Examples of small scale informal economies that some households operated in the study site villages included running public motor vehicle (PMV) or paid transport, operating trade stores, operating liquor stores, and market side vending with the aim of making profit. Some farmers from Burit and Vudal mentioned that they make good money from brewing alcohol from banana
and selling it. Although distilling home brew alcohol is illegal, many disadvantage families resort to brew illegally because the key ingredient is naturally available and can easily be transformed into an income generating activity. One farmer provided some detail on this:

‘One other potential I see is producing home brew alcohol. ENB homebrew is the best alcohol produced from ripe banana and its 100% spirit. We can produce home alcohol in small quantity and send it to say factory so they can reduce the alcohol content package and sell. It’s another means of income. The government stops home brew, but a lot more families are looking into brewing. They make homebrew to sell and get money to sustain themselves, but the Government does not see it this way. What alternatives has the Government provided us? Therefore, the only way is for the government to regulate it... I heard that the government is aware of it and may develop this industry’.

Despite operating such enterprises, their operations are severely constrained by traditional obligations and wantok system. For example, a farmer said:

‘...I have run a PMV (paid motor vehicle) business and owned 14 trucks, but I made losses’.

With the increase of goods and services, it is not only affecting the urban areas, but rural areas as well, so farmers are being challenged to look at any opportunity to engage as to earn a living.

13.6.6 Attending to Cultural Obligations

As described in Chapter 7, Section 7.5.1 and Section 8.2.6 farmers have wantoks, social and kinship networks and community cohesiveness as to maintain social capital. Cultural fabric has to be stable and it is the obligation of each member or family in the community to maintain the relationship. Therefore, in any cultural events or ceremonies that arise in the community normally it’s the obligation of each family or household to part take or contribute, as presented in Box 13.1.

Cultural obligations are important and are the duty of individuals and families to uphold and participate in the community. For example; if there is a death in the village, normally the whole village will be mourning for 5 days or a week. During the period of mourning people are forbidden to attend to normal livelihood activities except for food preparation and cooking (often other families provides meals for the deceased family and visitors). Even if a member of the community is working in town or in another province, have to take compassionate leave from their employer(s) to attend the funeral. Community members not only attend to the funeral, but also have to contribute money and food towards the funeral costs and burial rituals.

Villagers attend some social activities that are sometimes in gender lines. For example, only men may attend to meetings over land matters with dispute clans, or they may attend to cocoa training conducted by extension agents. In some instance the woman (wife) may take care of a family member who may be sick and admitted to a hospital in town so may not attend to normal daily chores and garden work, thus putting pressure on family members to step in for the household tasks left behind by the wife or mother. There are other socio-cultural activities like; traditional festivals and dancing, bride price, compensation ceremonies, etc., that occurs from time to time that both men and women attend to. Even though these activities do not occur regularly, but can be crucial and devastating if such circumstances and situations occur at the wrong time. For example, there may be a death in the village...
on the day when a cocoa farmer supposes to dry his fermented cocoa beans. The death would cause much inconvenience to the cocoa farmer as he may delay to dry his cocoa beans thus affecting the quality of cocoa and may be rejected by the buyers when sold. A farmer said;

...'when there is a death, we have to remain in the funeral house for a week or so and relatives come and we mourn. When we find a date, we formally end the funeral and then go our own ways to continue to do what we do. It is a burden to us as we don’t attend to our cocoa and food gardens'.

Furthermore, other routine tasks are overlooked that puts a lot of pressure on family labour to cope with.

Box 13.1: A story of cultural obligation

13.6.7 Church activities

It is apparent that farmers place a great deal of importance on income generation activities and food gardens to sustain their livelihood, however, it was also revealed that attending to church activities and cultural obligations was very much important. The farmers of Vudal and Burit belong to the Uniting Church and the Roman Catholic Church, while the Wampup and Gabsongkeg farmers are mostly Lutheran. They believe that it is through their faith in God and their commitment and contribution to church activities, in cash and in kind, will bring blessings to their family’s well-being and prosperity, as stated clearly by a farmer:

'...I feel obliged to give time to church, works because all the good things or blessings that I reap from cocoa and the sales of chicken is the blessing from God so I need to dedicate some of my time to church work. I have seen blessing or a good return from my farming work and my family are happy because of my involvement in church activities'.

Another farmer acknowledges that he is spending more time volunteering in building a new Community church, but he believes in a good cause:

'...I think I am spending more time with church work. I am currently helping the carpenters to build our new church because all blessing comes from God and it is rightful to support church work'.

It can be seen that church activities draw farmers time and labour away from cocoa, gardening and other income generating activities, but it is equally important to them as to balance their spiritual and social realms of their lives thus polarising their spiritual and mental energy that then is translated into physical compliance. For example; having faith and believing in God strengthens their spiritual wellbeing, thus giving them a purpose in life to live and be committed to work hard. The outcome is seen as a blessing of their belief and faith. Therefore, their faith has strong interconnections with the outcome of their livelihood, so attending to church activities is important to them.
13.6.8 Leisure Activities

Generally, in rural areas, a farmer’s life is never easy. As revealed from the livelihood activities described of the farmers in the four villages above, that both men and women play a significant role in sustaining the livelihood of the household and contributing to the community. They are mostly involved in income generating and household activities, however, they also engage in some leisure activities.

Now the choices of their daily activities are essential and thus creates a pattern. It appears that the morning tasks done are crucial to generate income or to provide food for the family while the afternoon tasks are not crucial (mending the roof or doing laundry) but they are able to do this when appropriate and when they have time to do so this can be classified as leisure activities. In general, leisure activities are complementary tasks done that can be active or passive. For example the man mending the roof and woman doing laundry are active leisure activities. However, if the man decided to chew betel nut and chat with folks under a mango tree, and/or woman having a nap would be seen as passive leisure activity. Nevertheless, they often find a balance in their line of tasks.

Some of the leisure activities that were noticed in all study sites included minor house and fence repairs, broom and basket making, some housekeeping work, lesser fishing, attending to village meetings, attend to church activities, attend extension trainings, sports, tradition dancing, sitting around chatting and gossiping, visiting friends and relatives out of the village or province, and many more.

In general, in the study site villages it was obvious that farmers, especially men, would spend more time in leisure activities than women. However, both men and women are also aware of crucial tasks that need to be done at the right time and attention and efforts were instilled and were also causal to leisure activities. It is complex to know how farmers allocate adequate time and resources into such crucial tasks (food and money generation activities).

13.6.9 Section Summary

It appears that farmers in the study sites actively participate not only in farming or non-farming but also in off-farming activities such as chores and up keeps, paid jobs, sawmilling, small businesses like trade stores or PMV, attend to church activities, cultural obligations, and general leisure activities. The study indicates that farmers do multiple activities in any one time including
farming. That means resources are thinly spread throughout all activities engaged in and little is committed into cocoa, thus contributing to low production. It is also noted that more time is spent in attending cultural obligations and church activities than activities that will generate income. To some extent this indicates that their connection to culture is paramount and RD&E agents need to be mindful of the give scenario to accommodate such socio-cultural needs in the process of bringing change in other economic driven interventions.